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Volume 2 Number 9
March, 1983
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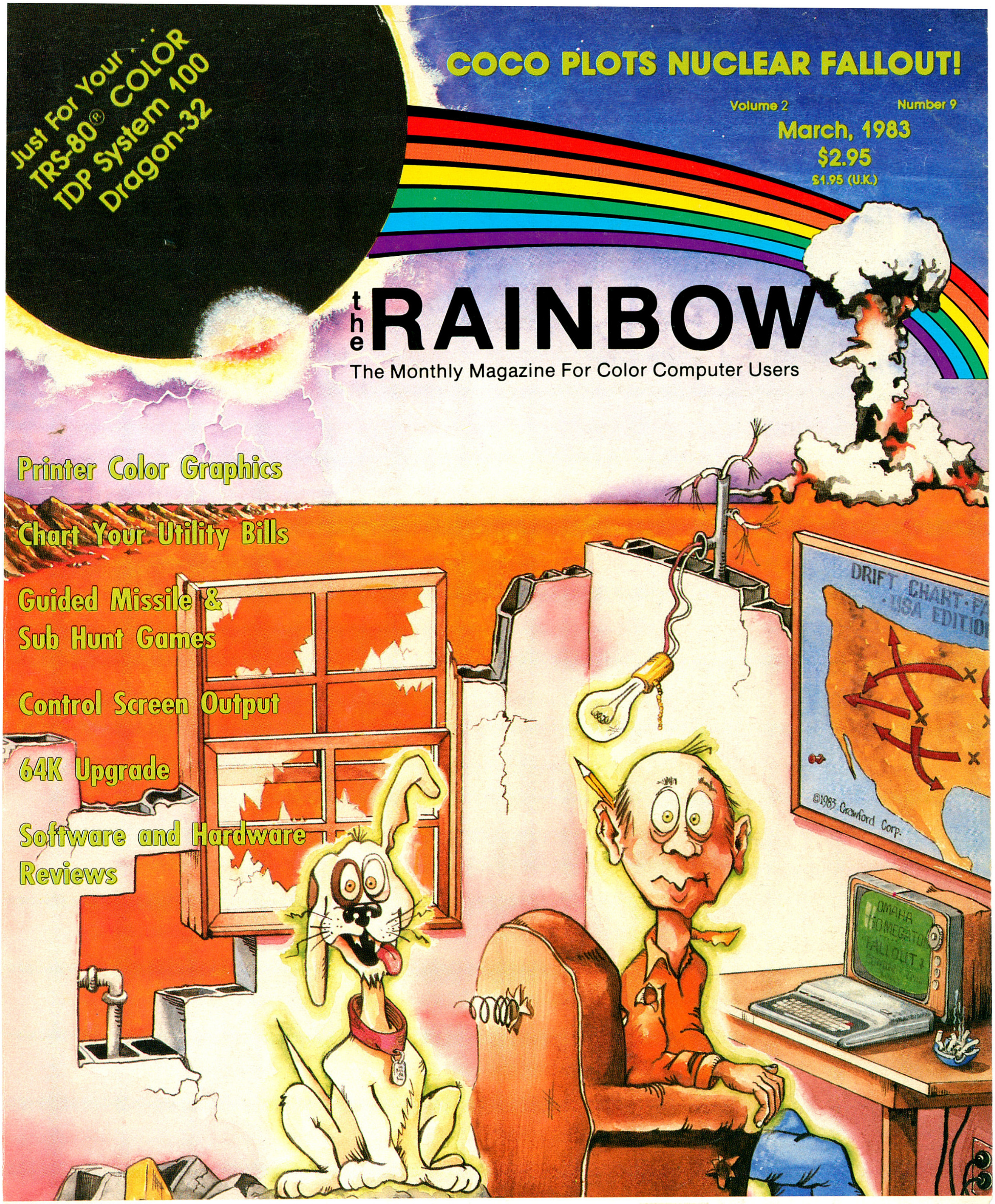
The Monthly Magazine For Color Computer Users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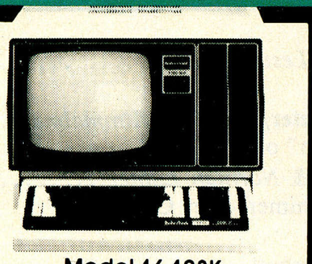

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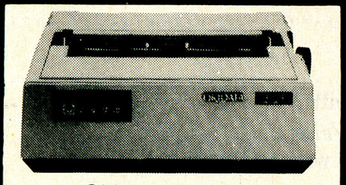

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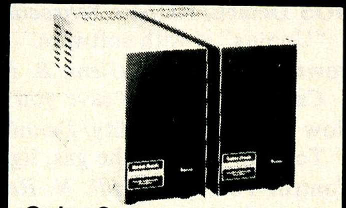

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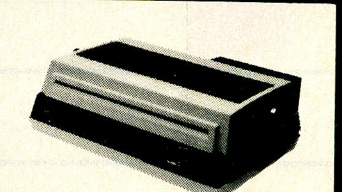

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Under the Rainbow

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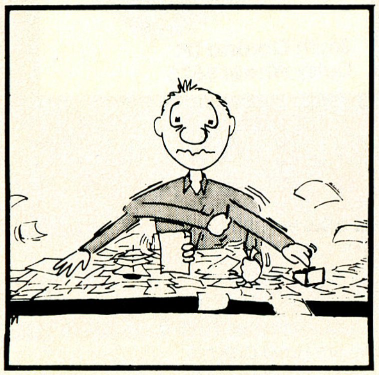

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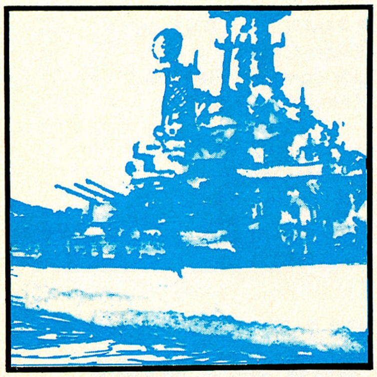

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NEXT MONTH: It is time to start thinking about entering our simulation contest—and we'll have a bang-up simulation for you to play...and from which you can get some ideas. Contest details, too.

Also, a really in-depth look at hex, a fine utility and a new column on your legal rights as a software buyer and/or author. And, another great game.

PLUS . . . A new edition of the Scoreboard, more programs, more tutorials, more information and more reviews on CoCo than anywhere else in the world! Don't miss April's *Rainbow!*

The Rainbow

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letters to RAINBOW

BECOMING A MUNK?

Editor:

In response to Jarrod Hollinghead's high score of 112,500 on *Dunkey Munkey*; I've got a 16 year old member (Kevin Hammerschmidt) of my congregation who scored 172,500 and quit because it was boring! I'm lucky if I break 70,000! Well, back to writing sermons on Telewriter...

Rev. Mike Jackson
Dardenne Prairie, MO

Editor's Note: We've gotten a lot of letters about scores—so, we've initiated a new feature this month, *Rainbow Scoreboard!* We invite your contributions to it for your scores in all the games available for CoCo.

KUDOS

Editor:

Having very recently purchased a Dragon-32, and surrounded myself with many magazines, I came across an advertisement for *the Rainbow* which is now available here in England. On reading *the Rainbow* I must admit that I went from a mildly interested computerist to a very keen trier and have subscribed for a regular supply.

I am adamant about "getting on top" of programming, but unfortunately at the moment I cannot carry out the minor adjustments necessary to make some of the TRS-80 programs run on my Dragon. Do you think you could include the minor adjustments in your future issues?

I.C. Hawksworth
Derby, England

Editor's Note: The English Edition, as opposed to the Edition in English, now carries adjustments for the Dragon. We felt this was necessary in order to take care of the minor changes.

WANTS A POSTER

Editor:

As I have said before, in my opinion, there is no other magazine comparable to yours. I receive several magazines each month, including *Science Digest, Peterson's Photographic*, and others of a technical nature. Of all of them, I look forward to receiving yours most of all. I enjoy the articles and the format is very well done.

In addition to being a high school science teacher, I am also a semi-professional photographer and framer. Needless to say, I had the poster in the January issue matted and framed and hung within 24 hours of receiving the issue in the mail. I think it was great. Mr. Crawford is truly talented as an artist and January's cover readily confirms this.

Please poll your readers as to the interest in a poster of the January cover and any future poster quality covers. I'm sure there are many others like me who would love to collect images of this fast growing way of life.

I would also like to brag on one of your advertisers. Recently I ordered 24 tapes with boxes from *Micro 80*. In only a few short days, I received them. Due to no fault of theirs, eight of the boxes were broken during shipment. I called them and they told me to send them back for replacement. Not only did they replace the eight broken ones, they sent four more with them. Now, that's what I call *service*. It's nice to know there are still companies that believe in satisfying the customer.

Thank you again for the wonderful job you and your staff do each month.

Jimmie Bond
Minden, LA

Editor's Note: We've been thinking about offering the January cover as a poster, but the problem is we need some sort of minimum order. If others are interested in a poster at a cost of about $5, please drop us a line.

TOM'S A WINNER, TOO

Editor:

I was very pleased to learn when I arrived home from vacation that my program *Escape From Sparta* was selected as a winner in your First Annual Adventure Contest. The following day I bought a copy of January's issue and was excited to see that it had won Best Science Fiction Trophy. I was, however, extremely disappointed to see that the name of Thomas Hollerback, co-writer of this adventure did not appear with my own. Without his help I could not have written *Escape From Sparta. Escape From Sparta* was a joint effort and intended to be a joint entry. Apparently, I may have mislead you when I enclosed a separate letter in reference to the game signed only by myself. Tom's name appears along with my own in the program heading. Please give Tom the credit which he also deserves.

Rick Townsend
Bettendorf, IA

SIR GREGORY OF NEW YORK

Editor:

Thank you very much for the honor of having my program, *Sir Randolf of the Moors*, chosen to win first place in your recent non-graphics contest.

Until recently, I have been going it alone with my CoCo. Now I have a couple of friends interested, and I can talk "shop" with someone else besides my mirror.

I entered the contest not having any idea that I would even come close to a mention after the judging was completed. Thank you for giving me a large boost of incentive.

Gregory Clark
Syracuse, NY

OBJECTION

Editor:

These comments are to clarify statements made in the January 1983 review of *UP-1. UP-1* is designed as an aid to program development and not a peeker and poker. It allows programs to be stacked in memory until the memory is filled and has features for correcting defective programs.

The review stated that *UP-1* was written for a 4K machine. This is not true. Obviously more programs can be stacked in computers with larger memory. Programs can also be stacked in ROM Packs. It is true that the memory maps differ slightly for BASIC, Extended BASIC, and color disk systems. Before program stacking can be accomplished, the available free memory must be determined. Although Extended BASIC normally starts at 7681, programs can be stacked starting at 1537 if the extra graphic pages are not required. Programs can be stacked in disk systems starting around 4K. *UP-1* can be stacked with a defective disk program and *UP-1* used to correct the program.

UP-1 is not intended to replace the EB Editor. Suppose statement 20 appears as 8223 between statements 10 and 30 in a program. The Extended BASIC Editor cannot correct this, but by using the memory scan feature of *UP-1*, this error can be spotted and corrected by poking the correct values into the erroneous statement number's vector location.

A machine language subroutine was added to UP-1 which allows the operator to switch and run another program by entering *EXEC* M where M is the starting location of the subroutine. This updated program was sent to *the Rainbow* the first week in January.

Bill Chapple
Dynamic Electronics, Inc.
Hartselle, AL

CLUBS, CLUBS, CLUBS

Editor:

I would like to introduce you and your readers to the Phoenix Color Computer Club. Our club is open to anyone and everyone who expresses an interest in the Color Computer. Our meetings are held twice monthly on the first Tuesday and third Wednesday at the American Legion Post #1 located at 364 N. 7th Avenue, Phoenix. Interested persons may contact Mike Huffman, Secretary/Treasurer, at (602) 939-5666 or Tim Bremser, President, at (602) 939-2047 or Don Hendry, Vice-President, at (602) 386-5126.

Mike Huffman
Glendale, AZ

Editor:

I'm interested in forming a CoCo group in the Fitchburg, Leomonster, Lunenburg, Massachusetts area. If anyone is interested please write me, Jason Rahaim, Spring Street, Lunenburg, MA 01462.

Jason Rahaim
Lunenburg, MA

Editor:

Please let it be known that the DC^3 (Dade County Color Computer Users Group) has started. Would you believe the only one in Dade County? For info call George McVay, (305) 274-8727.

George McVay
Miami, FL

Editor:

The Medley Computer and Electronics Club has recently expanded to include representation by Color Computer owners. If interested please contact me (594-2755) or the President, Jamie Marriott, c/o MCEC, Canadian Forces Base, Cold Lake, Medley, AB, T0A 2M0.

John Plaxton
Medley, Alberta, Canada

Editor:

We are a Color Computer club in north Broward County (Fort Lauderdale) Florida, with a sister club in Dade County. Address: 1040 S.W. 61st Avenue, Margate, FL 33068.

Ernie Johnston
Margate, FL

Editor:

We are forming a Color Computer club in Memphis, and would like very much to hear from anyone interested in joining us. For futher information, please contact me at 4903 Warrington Road, Memphis, TN 38118. Thanks.

Ben Barton
Memphis, TN

Editor:

I would like to announce the formation of the Rockford Color Computer Club. For information write to me at 724 Irving, Rockford, IL 61103, or call 963-9187.

John Picot
Rockford, IL

Editor:

I bought my Color Computer in June and discovered *the Rainbow* in August. It's difficult to say which I'm happier with. My wife—the computer widow—has another opinion, but she may become a convert yet.

I would like to either join, or start, a Color Computer User's group in the Utica-Mount Clemens-New Baltimore, MI area. Anyone intersted, please call me at 949-4842.

John Herbert
New Baltimore, MI

Editor:

I would like to let you know that we have formed a club for Color Computer enthusiasts in Midland, MI. The club meets between 7 and 10 p.m. on the second Thursday of each month. Meetings are held in the lounge of the Grace A. Dow Library in Midland.

Further information may be obtained from:

Midland Color Computer Club
c/o Neil Drake
709 Coolidge
Midland, MI 48640
(517) 631-2939

We in the club enjoy reading *Rainbow* monthly. You and your staff are doing an excellent job. Please keep your quality publication coming our way.

Neil Drake
Midland, MI

Editor:

There is a new club in the South Bay area of Los Angeles County. The address is:

South Bay Color Computer Club
c/o Karen Schlotzhauer
2545 W. 225th Place
Torrence, CA 90505
(213) 539-2539

I have been enjoying *Rainbow* for nearly a year. It keeps getting better and better. Keep it up.

Karen Schlotzhauer
Torrence, CA

Editor:

You are invited to the next meeting of the Sea-Tac CoCo Club—the first Sunday of each month, from 1 p.m. to 3 p.m. Meetings are held at the offices of:

Counseling and Preventive Services
Oakhurst Office Park—Suite 121
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854-7072

At the meetings, you can get acquainted with other owners, discuss software and hardware experiences, and see demonstrations of programs and equipment. A 32K Color Computer, cassette recorder, disk drive, printer, and TV will be provided by Dr. Nugent, the director of CAPS.

Michael Nugent
Kent, WA

Editor:

I am trying to start a CoCo club in the Twin Lakes, Lake Geneva area here in Wisconsin. People can contact me (Dave Buehn) at 829 Hickory Road, Twin Lakes, WI 53181, or by calling me at (414) 877-2989.

Dave Buehn
Twin Lakes, WI

COCO COOKING

Editor:

When I'm finished with my computer in the evenings I drape a towel across it to keep out the dust. Wouldn't you know it, I left it on until the next day and when I removed the towel, it was cooking. But it still works like a champ. And they say need a fan in it...?

How about someone inventing a device that reads programs out of magazines and types them in your computer. My fingers are tired.

Chris Barnak
Suffolk, VA

Editor's Note: For aid to tired fingers, check page 174.

INFORMATION, PLEASE

Editor:

I am new to your magazine, and from purchasing just one issue I am already set on being a loyal reader from now on. I am the owner of a TRS-80 Color Computer and I have found more information in one issue of yours than I have seen in all my previous years as a TRS-80 owner. Your magazine has truly expanded my views on the capabilities of the CoCo. I recently upgraded my 16K computer to 32K and I would like to know if my computer is now capable of playing all 32K games and software. I thought perhaps I may have some RAM limitations being that it was originally a 16K computer. Keep up the excellent work, you're truly a remarkable magazine.

Charles Mastrandrea
Ann Arbor, MI

Editor's Note: No problem. You can use it for all 32K programs.

Editor:

I have an Okidata 80 Printer using a Micro Works P180C parallel printer interface. What I want to know is what are the printer control characters and program for a screen dump for graphics to the Okidata 80 Printer.

Please write me at 4026 Danube Circle if you can help me with this.

Willie Bethay
Valdosta, GA

RECOMMENDED READING

Editor:

My thanks to Eugene Bouley of RI for his recommendation (in the November *Rainbow*) of *Programming the 6809* by Rodney Zaks and William Labiak. It's everything he claimed!

Let me recommend another great book for those who are really serious about assembly language on the CoCo. *The Facts* by Spectral Associates shows you where just about everything is in the CoCo and how to use it.

Al Kalar
Sumner, WA

HELPFUL HINTS

Editor:

I think these letter to the editor sections are great. I thought I would put my two cents worth in.

If you own the Chess ROM Pack and a black and white TV, you probably have noticed that both sets of pieces appear the same shade. Changing original memory location $C0D1 to a $F0 or $F8 will remedy the problem.

I would like to see more information on disk drives.

Keep up the good work!

David Sweet
Carmel, IN

Editor:

Playing *Dungeon Adventure* into the wee hours of the night, I was rapidly gaining confidence and had reached the 17th level. I had defeated spiders, demons, wizards and the like when I was surprised and destroyed by a tiny bug. In my fatigued state, during a battle I hit the "fight" key instead of the "move" key. There being no one to fight I was hopelessly trapped in an endless loop.

Undaunted, I resolved to rest and try again. The next night, I was rapidly jumping levels and apparently jumped past level 20. After continuing for some time, I was attacked by 68 demons. That was when I gave up and checked the listing for the winning level and found it to be "=20."

Both of the above require only minor fixes. To avoid the entry error in the fight sequence, add this line:

```
1395 IFK$=CHR$(32)THENGOSUB
1440:GOTO1270
```

That will allow you to press the space bar if you have hit the "fight" key instead of the "move key" during the fighting sequence, and return to the options.

By changing line 1910 to read:

```
1910 IFAL(1)= 20THEN2280
```

the program will not continue endlessly if level 20 is passed. Nevertheless, congratulations to Gregory Ricketts for an excellent program and to *Rainbow* for their choice.

Pat Moss
Corydon, IN

Editor:

In Joseph Kolar's article "Let's Take BASIC Training," he asked "Do you find that your manual flops around and is unwieldy and awkward to use, etc., etc.?" His solution was to purchase another manual to cut out the pages you are working on, and save your original manual for reference. Well, I came up with what I think is a better solution. I purchased a music stand to hold my books when I need to program from them. It has worked out super! I can adjust the height, and place the stand at just the right angle so as to eliminate that terrible neck pain you get from keeping your head and neck bent down looking at your work on the computer table.

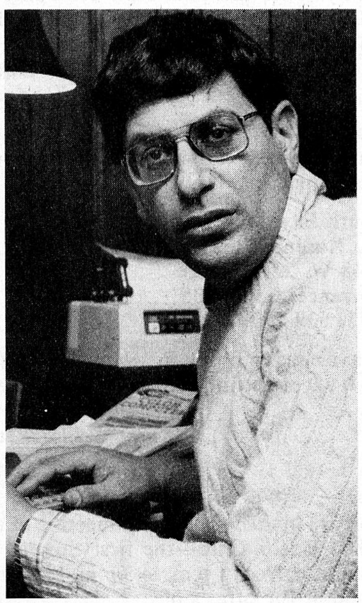
Your *Rainbow* is F-a-n-t-a-s-t-i-c! Keep up the good work, and please keep those articles for us apprentices coming.

PRINT #-2,

I am beginning to get really excited about RAINBOWfest—which is, after all, "CoCo's Very First Show!" As you will be able to see from information and registration material in *the Rainbow*, it is to be in Chicago, April 22-24, at the Regency-Hyatt Woodfield.

RAINBOWfest is going to be an all-purpose show—not just a trade exhibition. Yes, there will be a lot of displays with people and products. And most of the biggest names in the CoCo world will be on hand. You will see new products, learn some new things and have a chance to talk with other CoCoists from all over the country. We know of several groups planning to charter buses for the trip.

But there is to be more to RAINBOWfest! One of the biggest things will be a series of seminars and a breakfast talk. We have tentatively scheduled Don Inman to be the breakfast speaker. And, as you know, Don is the acknowledged master of computer graphics for the CoCo. This breakfast is open to everyone, so we hope you'll make plans to attend.



Then, too, the seminars will be run most of the day Saturday, and on Sunday as well. All the speakers and topics are not firm yet, but we will be covering everything from Basic hints to machine language animation, from the legal rights you have as a buyer of software to setting up and communicating with bulletin boards. Also: A special session is planned for officers of Color Computer clubs.

All in all, we hope RAINBOWfest will be a great weekend for anyone and everyone interested in CoCo—on all levels, from beginner to advanced programmer. If you can possibly make it, we hope to see you there.

I would like to thank everyone who has taken the time to write in about the changes we have been making to *the Rainbow*. The one which has, obviously, received the most attention is the "slick" paper. At this point, the positive comments are running well ahead of the negative ones—but there are a number of you who have expressed unhappiness with the new paper.

Those of you who are pleased with the "crisp," "neat," "professional" new look of our magazine will be pleased to know that, at least for now, we are keeping the "slick" paper. But, for those of you who have expressed unhappiness, you, too, will be pleased to learn that we are making a slight change soon that we hope will solve the most-mentioned problem—that of glare. We've found another "slick" paper which has a slight bluish cast to it (it is hard to tell unless the two papers are held up side-to-side). This paper will still give us the same "slick" look, but should be a little easier on the eyes. As always, we will appreciate your comments.

And, I suppose while commenting on the magazine in general, this is as good a place as any to welcome Jerry McKiernan to our staff. Sally Nichols, our art director, needed some help and Jerry is providing that as Assistant Art Director. Incidentally, Jerry's a whiz at what I call "dot art"—and I'm sure you'll be able to pick out some of his illustrations in this month's issue.

I would also like to welcome Patty King as our first advertising and special events manager. In addition to getting the advertising section in shape, Patty will be responsible for RAINBOWfest planning—and working with Dave Hooper, who is the local arrangements chairman in Chicago. Patty is very qualified to work on a project like this—she was responsible for all the planning of the U.S. Conference of Mayors in Louisville a couple of years ago.

One of the things which has happened this past month is a couple of letters flying back and forth from various people concerning a letter which appeared in the *Bouquets And Brickbats* section of last month's *Rainbow* about a product.

One of the letters was from Thomas Cassidy of Ozone Park, N.Y., in defense

(Continued on Page 188)

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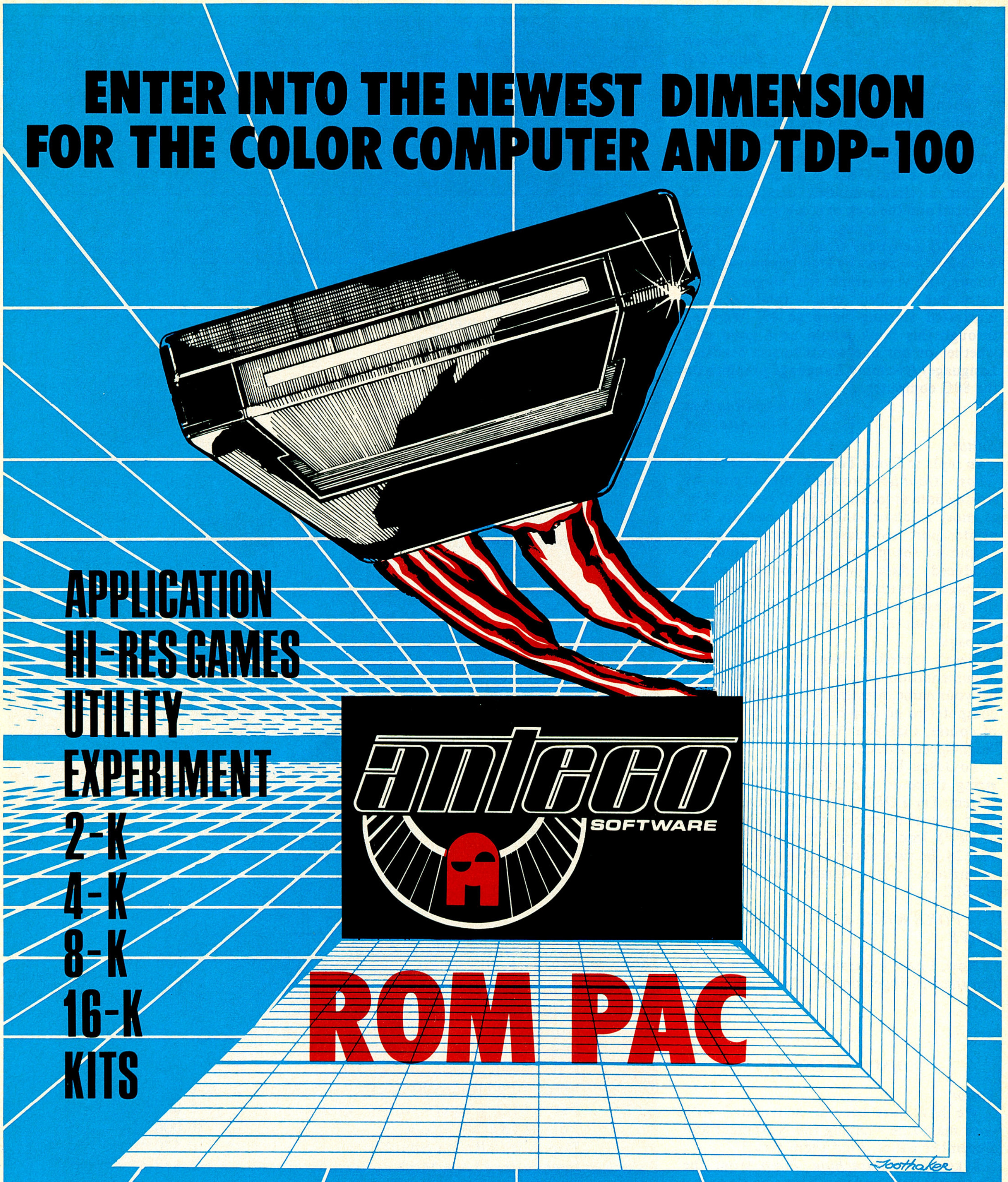

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Editor:

When anyone starts to learn/use Assembly Lanugage for the 80C he/she will soon run up against the terrible lack of instructions on how to enter a line of Assembly code. This is a simple stage, almost a simple-minded one, but it is essential and the lack of it can stop a learner of Machine Language cold. In the book *Assembly Language Graphics for the TRS-80 Color Computer* by Don Inman and Kurt Inman, the very simple first stages of data entry are spelled out, explained, and illustrated starting on page 49. Working through this book would be a good idea whether or not one wants to use Machine Language/Assembly Language graphics on the 80C computer.

Paulette Granthan
Palo Alto, CA

Editor:

In reply to Doug Tooms' letter (January), *Ghost Gobbler* produces its sound by storing data at location $FF20 very quickly, as most machine language games do. The printer port also uses this location as an output to the printer. So, when sound is produced, data (which comes out as garbage) goes to the printer. The reason that this garbage is only printed every once in a while, is that the printer's buffer buffers the garbage.

Here's something else that is not in the documentation. When *Ghost Gobbler* asks for your name, pressing SHIFT@ causes the computer to go into high speed (providing, of course, that your CoCo works with the "high-speed *POKE*").

To Jorge Mir who wanted to move his string space to the extra 8K of his 64K system: Try *POKE*ing the highest address of your extra memory (which I believe is $FEFF) into the low memory locations $27/28. Be careful not to use more than 8K of strings or you might run over Disk BASIC.

POKE &H27, &HFE : *POKE* &H28, &HFF

Now, I have a question. How is SLENB* (on the cartridge connector) utilized?

Kyle Rogers
Knoxville, TN

JUMPING DOWN

Editor:

We have just become acquainted with your magazine—having the November and December issues. Find them great!

I keyed in *Parachute Jump* from the December issue and now have a battle on my hands. Our son (11 years old) has beaten his father's score and, of course, that can't go unchallenged. I think they play it just to see the lightning bolt and to hear the tune being played as the poor chutist drops to ground after the bomb gets him. But then I could be wrong.

Betty Cutler
Clifford, Ontario, Canada

RAINBOW SCOREBOARD

Do you recall Jarrod Hollinghead's letter to the Editor a few months ago referring to his *Dunkey Munkey* score, asking if anyone had done better?

Well, we've gotten a number of letters from readers as a result of Jarrod's initial inquiry, and thought we might develop this interest into a regular feature devoted to listing the high scores of readers for any game for the 80C that registers players scores.

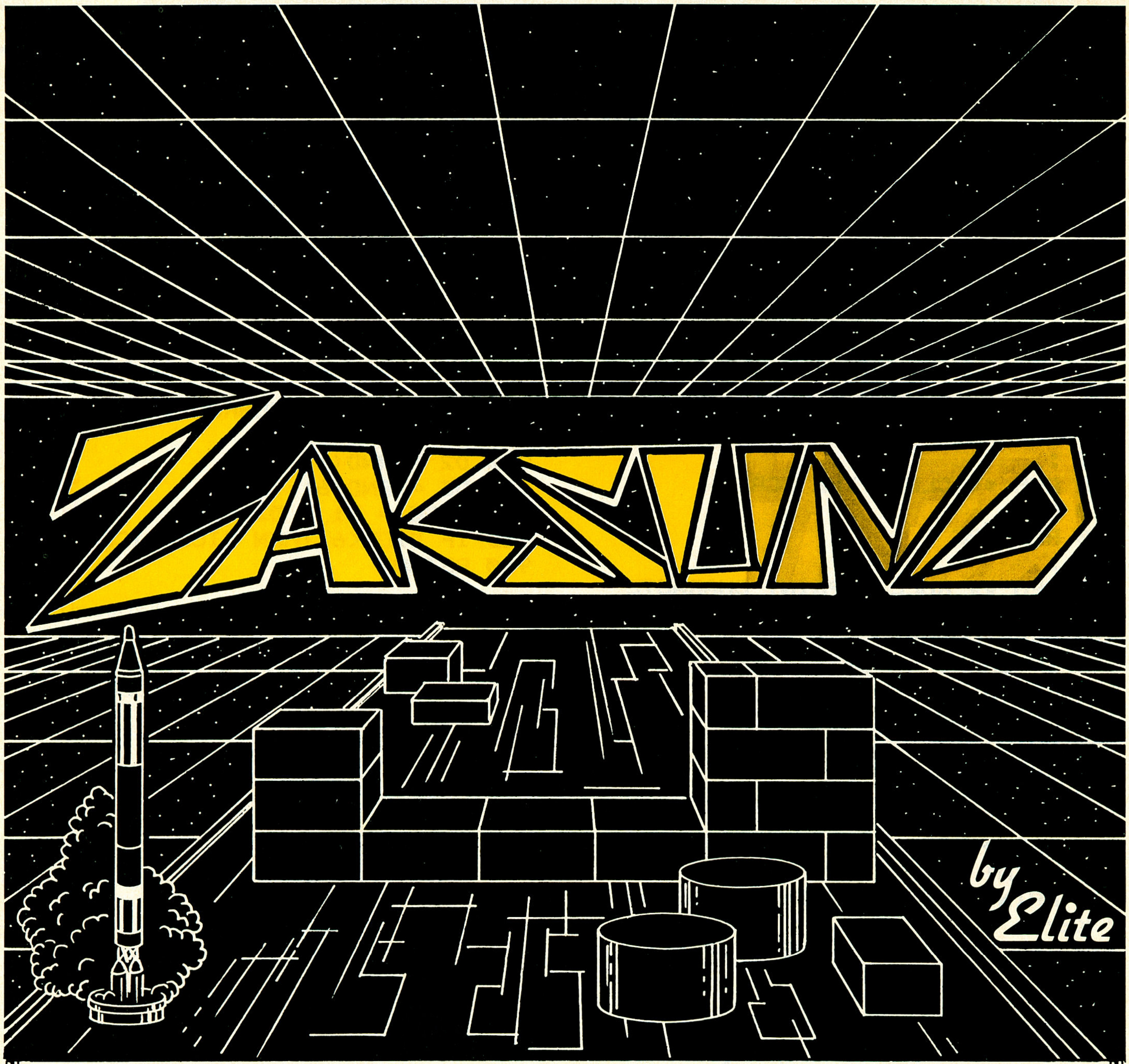
So, let us hear from you. Whatever the game—send us your high score along with your name, city and state and we'll publish it right here in our *Rainbow* Scoreboard column.

GAME	SCORE	PLAYER
Dunkey Munkey	1,099,400	Andrew Herron, High Point, NC
Dunkey Munkey	1,000,500	Wendy Johnson, San Jose, CA
Dunkey Munkey	311,500	Sara Hennessey, Golden Vally, MN
Dunkey Munkey	304,000	Mike Wells (11), Pittsburgh, PA
Dunkey Munkey	300,000	Cameron Amick, Reisterstown, MD
Dunkey Munkey	293,300	Kim Cook, High Point, NC
Dunkey Munkey	251,200	Todd Bernhard, Rochester, NY
Dunkey Munkey	250,000	Dave Roper, Lambertville, MI
Dunkey Munkey	172,500	Mike Jackson, Dardenne Prairie, MO
Dunkey Munkey	144,900	Aaron Findley, Sierra Madre, CA
Scarfman	388,060	Michelle Thompson, Milpitas, MS
Ghost Gobbler	825,250	Randy Gerber, Wilmette, IL

Cameron Amick obviously spends a great deal of his computer time as a gamer, and since he has gone to the additional trouble of logging his scores and mailing them to us, we thought we would print them. His *Dunkey Munkey* score of 300,000 points lands him in fifth place on this month's Scoreboard for that game. As his other scores are uncontested, we suppose that gives him at least a temporary first place in those game categories. This is a distinction shared by Michelle Thompson and Randy Gerber, whose uncontested scores for Scarfman and Ghost Gobbler, respectively, make them gamers without peer.

Here is the summation of Cameron's considerable efforts.

Astro Blast (Mark Data)	63,000
Avenger (Cornsoft Group)	5,000
Colorpede (Intracolor)	245,723
Color Haywire (Mark Data)	9,150
Color Meteoroids (Spectral Associates)	149,000
Color Invaders (Spetral Associates)	83,000
Colour Pac Attack (Computerware)	193,000
Donkey King (Tom Mix)	115,600
Dunkey Munkey (Intellectronics)	300,000
Katerpillar Attack (Tom Mix)	10,249
Mega-Bug (Radio Shack)	6,211
Pacet Man (American Sm. Comp.)	5,000
Polaris (Radio Shack)	36,000
Pop Corn (Radio Shack)	110,570
Protectors (Tom Mix)	358,514
Skiing (Radio Shack)	1:13.25
Space Assault (Radio Shack)	28,850
Sky-Defense (Quasar Animations)	5,200
Storm (Computerware)	380,000
Starship Chameleon (Computerware)	168,500
Starfire (Intellectronics)	464,700



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Roll Those Bones (And Other Characteristics)

By Bob Albrecht and George Firedrake
***Rainbow* Contributing Editors**

Last time, we showed you three short programs to "roll" the seven basic characteristics for a fantasy role playing character. Here is one of the programs.

```
_100 REM ** CREATE A CHARACTER
199 :
300 REM ** CLEAR THE SCREEN
310 CLS
320 RESTORE
399 :
500 REM ** ROLL & PRINT CHARACTE
RISTICS
510 READ CHAR$
520 IF CHAR$ = "ZZZ" THEN 710
530 GOSUB 910
540 PRINT CHAR$, DICE
550 GOTO 510
560 DATA STR, CON, SIZ, INT
570 DATA POW, DEX, CHA, ZZZ
599 :
700 REM ** TELL HOW TO DO AGAIN
710 PRINT
720 PRINT "TO DO AGAIN, PRESS AN
Y KEY"
730 IF INKEY$ = "" THEN 730 ELSE
 310
799 :
900 REM ** DICE SUBROUTINE
910 D1 = RND(6)
920 D2 = RND(6)
930 D3 = RND(6)
940 DICE = D1 + D2 + D3
950 RETURN
```

Our program rolls a number from three to 18 for each and every characteristic. Alas, a character with SIZ 15, STR 3, and DEX 5 will never make it in the GameMaster's world. So, we suggest some alternative DICE subroutines.

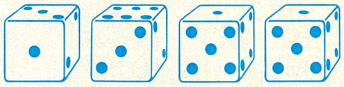
Our first variation. Roll 3D6. If DICE is less than 6, assign 6 as the value.

```
900 REM ** DICE SUBROUTINE
910 D1 = RND(6)
920 D2 = RND(6)
930 D3 = RND(6)
940 DICE = D1 + D2 + D3
950 IF DICE<6 THEN DICE=6
960 RETURN
```

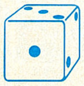
Our second variation: A more generous GM says, "If DICE is less than 6, add 3 to the value of DICE."

```
900 REM ** DICE SUBROUTINE
910 D1 = RND(6)
920 D2 = RND(6)
930 D3 = RND(6)
940 DICE = D1 + D2 + D3
950 IF DICE<6 THEN DICE=DICE+3
960 RETURN
```

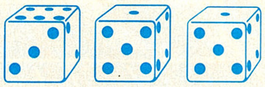
We hear some GMs allow players to roll 4D6 and take the best three. If you roll



you can discard



and take



for a total of 13

Hmmm...we get the same result if we add all four dice and subtract the smallest. Here is our first attempt.

```
900 REM ** DICE SUBROUTINE
910 D1 = RND(6)
920 D2 = RND(6)
930 D3 = RND(6)
940 D4 = RND(6)
950 SMALL = 7
960 IF D1<SMALL THEN SMALL=D1
970 IF D2<SMALL THEN SMALL=D2
980 IF D3<SMALL THEN SMALL=D3
990 IF D4<SMALL THEN SMALL=D4
1000 DICE=D1+D2+D3+D4-SMALL
1010 RETURN
```

Here is another way, using subscripted variables.

```
900 REM ** DICE SUBROUTINE
910 FOR KK=1 TO 4
920 : D(KK) = RND(6)
930 NEXT KK
940 SMALL = 7
950 FOR KK=1 TO 4
```

```
960 : IF D(KK)<SMALL THEN SMALL=
D(KK)
970 NEXT KK
980 DICE=D(1)+D(2)+D(3)+D(4)-SMA
LL
990 RETURN
```

We suggest a third way for you to try. Write lines 910 through 930 as we did above, putting the four dice values in D(1), D(2), D(3), and D(4). Next, *sort* these values so the *smallest* value is in D(4) and the other three values are in D(1), D(2), and D(3). Finally, compute: DICE = D(1) + D(2) + D(3).

Our program rolls seven basic characteristics for a *Worlds of Wonder* or *Runequest* character. For a *Dungeons & Dragons* or *Tunnels & Trolls* character, change only lines 560 and 570.

D&D Character: 560 DATA STR, INT, WIS
570 DATA DEX, CON, CHR, ZZZ

T&T Character: 560 DATA STR, CON, IQ
570 DATA LK, DEX, CHR, ZZZ

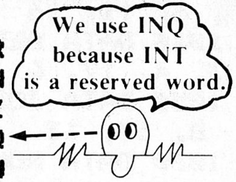
A SMALL CAST OF CHARACTERS

We have begun a cast of characters. Below are their names and characteristics.

	STR	CON	SIZ	INT	POW	DEX	CHA
Aloysious	10	11	10	12	10	12	9
Barostan	17	17	13	8	7	15	6
Bridla	11	12	10	15	6	11	16
Dernfara	13	13	8	13	4	17	6
Joleen	13	11	7	13	8	17	13
Rokana	9	9	9	17	18	9	10

Here is a simple information retrieval program. Information about our characters is stored in *DATA* statements. If you type in the name of one of these characters, the computer will find the information and display it on the sreen.

```
100 REM ** CHARACTER FINDER
199 :
200 REM ** WHO$ IS CHARACTER
210 CLS
220 INPUT "NAME OF CHARACTER"; W
HO$
299 :
300 REM ** START AT BEGINNING OF
 DATA FILE
310 RESTORE
399 :
400 REM ** READ RECORD. EOF?
410 READ NAME$
420 READ STR, CON, SIZ, INQ, POW
, DEX, CHA
430 IF NAME$="ENDFILE" THEN 810
ELSE 510
499 :
500 REM ** IS IT OUR CHARACTER?
510 IF NAME$=WHO$ THEN 610 ELSE
410
599 :
600 REM ** FOUND OUR CHARACTER
610 PRINT
620 PRINT "STR", STR
630 PRINT "CON", CON
640 PRINT "SIZ", SIZ
650 PRINT "INT", INQ
660 PRINT "POW", POW
670 PRINT "DEX", DEX
680 PRINT "CHA", CHA
699 :
700 REM ** TELL HOW TO DO AGAIN
710 PRINT
720 PRINT "TO DO AGAIN, PRESS AN
Y KEY"
730 IF INKEY$ = "" THEN 730 ELSE
 210
799 :
800 REM ** OOPS! NOT IN FILE
810 PRINT "I DON'T KNOW " WHO$
820 PRINT "TO DO AGAIN, PRESS AN
Y KEY"
830 IF INKEY$ = "" THEN 830 ELSE
 210
899 :
1000 REM ** DATA FILE
1010 DATA ALOYSIOUS, 10, 11, 10,
 12, 10, 12, 9
1020 DATA BAROSTAN, 17, 17, 13,
```


We use INQ because INT is a reserved word.

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```
8, 7, 15, 6
1030 DATA BRIDLA, 11, 12, 10, 15
, 6, 11, 16
1040 DATA DERNFARA, 13, 13, 8, 1
3, 4, 17, 6
1050 DATA JOLEEN, 13, 11, 7, 13,
 8, 17, 13
1060 DATA ROKANA, 9, 9, 9, 17, 1
8, 9, 10
1070 DATA ENDFILE, 0, 0, 0, 0, 0
, 0, 0
```

Lines 1010 through 1070 are a *data file*. This file consists of seven *records*. Each record consists of a character's name followed by seven numbers. For instance:

```
1030 DATA BRIDLA, 11, 12, 10, 15, 6, 11, 16
              ↑        └──────────┬──────────┘
            Name            Seven numbers
```

The last record, which begins with ENDFILE, is not an actual character record. Instead, it is an *end-of-file* (EOF) record. If you enter a name that is not in the file, the CoCo will search in vain and arrive at ENDFILE. It will then print I DON'T KNOW followed by the name you entered. This will also happen if you misspell a name that is in the file, or even if you ask it for ENDFILE.

ENTER the program and type *RUN*. It begins like this:

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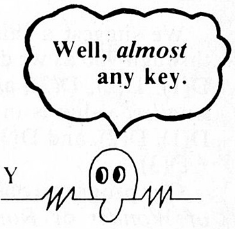
```
NAME OF CHARACTER?
```

Type BRIDLA and press the *ENTER* key.

```
NAME OF CHARACTER? BRIDLA
STR    11
CON    12
SIZ    10
INT    15
POW     6
DEX    11
CHA    16

TO DO AGAIN, PRESS ANY KEY
```


Well, *almost* any key.

You can change these records to records for *your* characters. Remember to put ENDFILE in the last *DATA* statement.

Your turn. Write a program to display the entire file, one record at a time, beginning with the first record. To get the next record, press the space bar.

What happens when you tell the computer to compute a random number of a random number? For instance, suppose you tell the CoCo to compute:

RND(RND(2))

Hieronymus Heuristicus wrote a program to find out. His program counts how many ones and how many twos occurred in a sample of RND(RND(2)) numbers.

"Well, an RND number is an RND number," thought H. H. as he typed RUN. "I'll get about the same number of ones and twos." But here is what actually happened.

```
HOW MANY RANDOM NUMBERS? 100
POSSIBLE VALUE          NUMBER OF TIMES
 1                        73
 2                        27
TO DO AGAIN, PRESS ANY KEY
```

Surprised, he tried again.

```
HOW MANY RANDOM NUMBERS? 1000
POSSIBLE VALUE    NUMBER OF TIMES
 1                  758
 2                  242
TO DO AGAIN, PRESS ANY KEY
```

Perplexed by this strange behavior of usually predictable unpredictable numbers, H. H. called his friend, Annalee Analyticus. After hearing what happened, A. A., chuckled, then told her friend why it happened.

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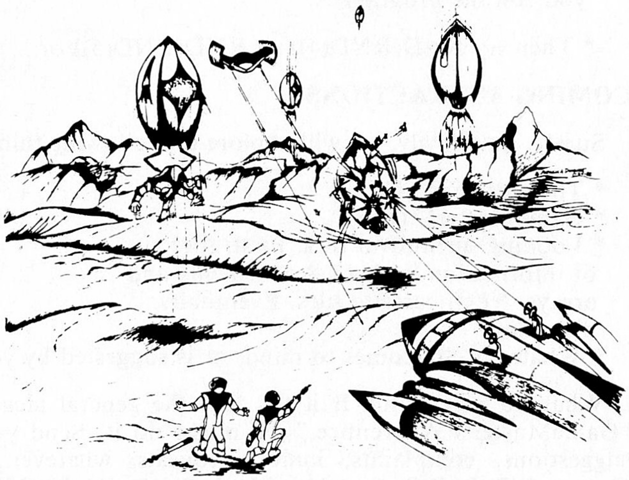
COLOR ALIEN DEFENSE

by Doug Schwartz



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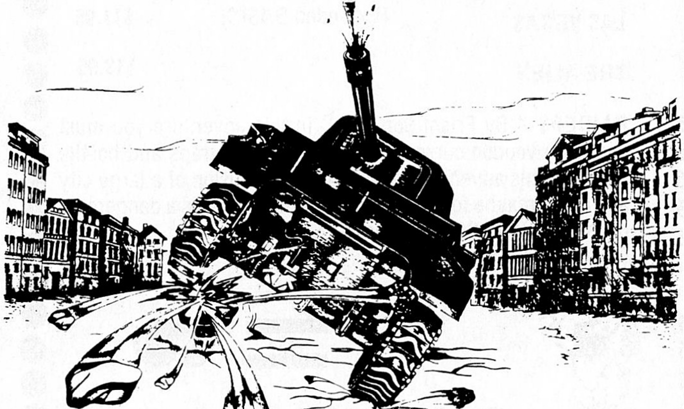

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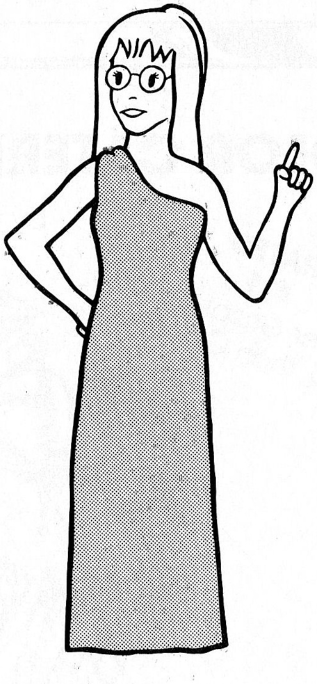

* What did A. A. tell H. H.? Why did the computer compute lots more 1s than 2s for RND(RND(2))?

*When the CoCo computes the value of RND(2), the probability of getting 1 is one in two; the probability of getting 2 is also one in two. For RND(RND(2)),

(a) what is the probability of getting 1?
(b) what is the probability of getting 2?

* Hmmm...what about RND(RND(3))? The *possible* values are 1, 2, or 3. Modify Hieronymus's program so the computer counts how many 1s, 2s, and 3s occur in a sample of RND(RND(3)) numbers. Can you predict what will happen *before* you run the program?

* Then try RND(RND(4)) or RND(RND(5)) or....

COMING ATTRACTIONS

Surely, but slowly, we will explore the following things:

* The elusive RND
* GameMaster's Dice
* Looking up stuff in files. First, files of information in *DATA* statements and arrays. Next, cassette files. Eventually, disk files.
* Whatever else comes to mind, or is suggested by you.

What do *you* want? If it fits into the general idea of "GameMaster's Apprentice," we might do it. Send your suggestions, complaints, kudos, requests, whatever...to George & Bob, P.O. Box 310, Menlo Park, CA 94025.

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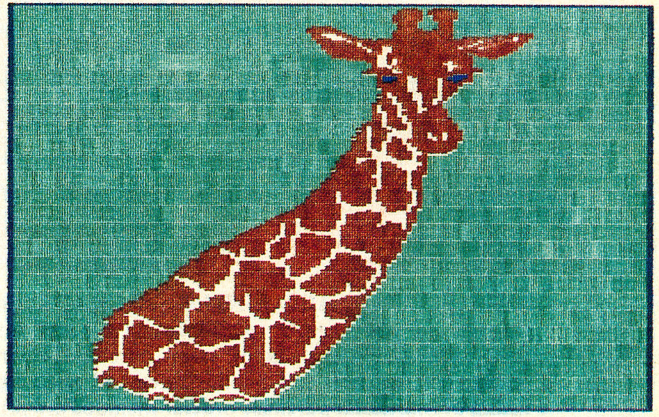


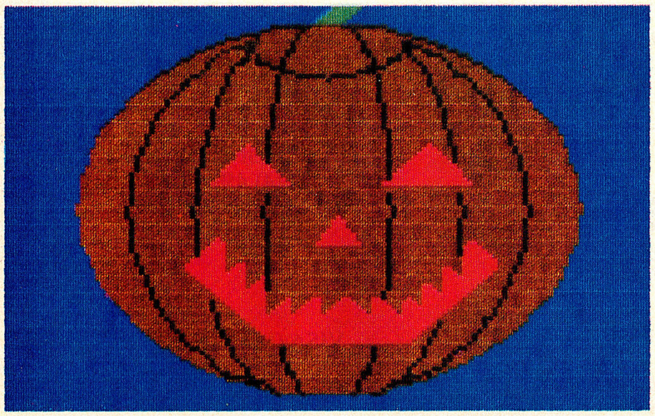
Screen-To-Printer Color Graphics

By Lane Lester, Ph.D.

Breathes there a CoCoNut with soul so dead,
Who never in his heart of hearts has said,
"Oh, how I wish I could make color copy
Of that display on my color TV!"?

The dim recesses of my mind which produced shreds of the poem that stimulated the couplet above just will not produce the author's name so that I can apologize to him. As tragic a blow as my efforts may be to the world of literature I am sure that the poem does indeed express a feeling that many of us have had. Imagine my delight when Francis Kalinowski published "Printer Color Art" in the September 1982 issue of *80 Micro* which showed how to make beautiful multi-colored pictures on the Epson MX-80. Because you're probably not as lazy as I am you can't imagine my disappointment when I realized how much programming would be involved to produce each picture. Sadly I set aside the tools that Francis generously provided and went on to less-demanding tasks.

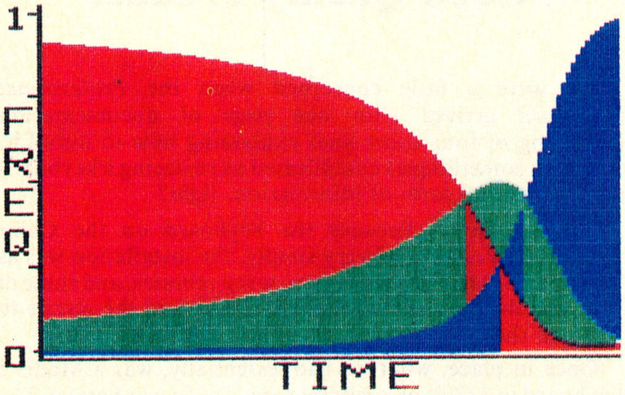
But now the light has dawned again! Using programs provided for us by two giants of the CoCo world it is possible for indolent folks like me to have beautiful reproductions of screen graphics. Arnold Pouch, now deceased, developed Motion Picture Programming based on a drawer program in the August 1981 issue of *Chromasette.* This powerful technique which Arnold described in the March and April 1982 issues of *the Rainbow* makes the creation of graphic displays a pleasure. A complete set of programs and a tutorial are available from Superior Graphic Software, or you can buy the Chromasette and use *the Rainbow* articles to make the changes to MPP. Making printer copies of MPP graphics is a snap with the Graphic Screen Print Program (GSPR) sold by Mel Hefter of Custom Software Engineering. Versions of this program are available for most of the popular printers. While this means that anyone can at least have black-and-white screen prints, the availability of colored ribbons will determine whether color prints are possible. Colored ribbons for a number of printers are available from Check-Mate and from B.T. Enterprises. A list of suppliers' addresses is given at the end of this article.



The illustrations that accompany this article demonstrate the results you can expect. The jack-o-lantern came from a program I wrote to run Halloween night with the TV in our bay window. It was done in PMODE1 which gave me four different graphics which could be switched and provided Jack with the ability to blink, wink, and "talk." The giraffe was done by projecting a 35mm slide on the wall and tracing it onto a clear plastic sheet. This sheet was taped to the television screen, and then the MPP program was used to create the graphic. In PMODE3, one graphic has the eyes open and the other, closed. A formula using RND provides a very natural blinking of the eyes. If you've had a biology course recently enough you may realize that the picture with the blue blobs represents the electron transport system. This is from an MPP animated graphic series in PMODE1 that I use to illustrate one of my biology lectures. The three-color graph illustration was produced by a graphing program I published in the March 1982 issue of *Color Computer News.* The lettering on the graph was done with another program available form Custom Software Engineering, *Alpha-Draw*, which can be added to any graphic program.

"Enough," you say, "I'm sold. Now how can I make color prints of graphic screen displays?" In addition to the appropriate hardware and supplies, you first need to get and learn to use the MPP program. I'm going to assume you've done that in the following discussion. The GSPR program is in machine language and comes with instructions for editing Basic programs such as MPP so that they will load and execute GSPR. In addition to those changes I added to line 22 of MPP an "L" option which *GOSUBs* to "330 X=USR1(0):RETURN", executing the screen print.

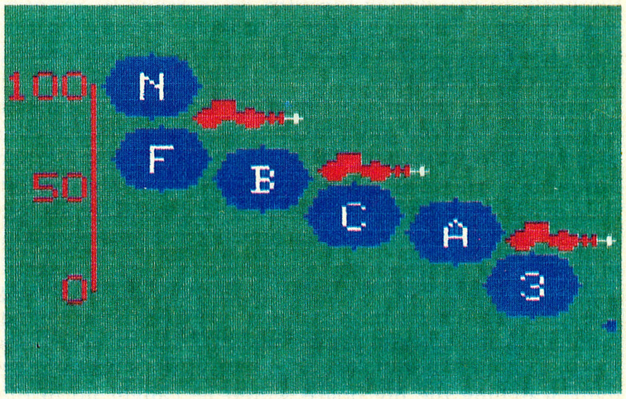
Although typical screen graphics have several colors, they must be altered considerably in order to produce color prints. This is necessary because each color requires a separate pass through the printer with a different ribbon in place. For each color in the print, that part of the screen display is changed to red (simple with MPP) which with GSPR gives the densest printing. The rest of the graphic is erased to green which is unprinted. In your original graphic program you may use the eight pages of graphic RAM for animation, but for the screen print you can use them for multiple copies of the graphic. In PMODE1 you could store four different versions, one for each of four colored ribbons. If you are using more than four colors or a higher PMODE, you would make separate saves of the graphics which with MPP is rapid (at least with disk) and convenient.



In order that the different colors will be properly located on the paper, accurate re-positioning of the paper for each pass is critical. This should be quite easy with most printers. On the Epson, just to the right of the left tractor lock, is a black horizontal ridge which serves as an index. The brand of paper I use is numbered along the left perforated strip and after each run I return the paper to the same number. If your paper is not numbered or your printer does not have an index, Francis Kalinowski, in his *80 Micro* article, suggests placing a piece of paper tape at the edge of the tractor. Then you can make a pencil mark across the tape and onto the paper to use as a guide. So that with each run the paper will have the same tension, I rewind past the number and then return. Francis suggests an even more precise approach, and if you run into problems you might want to consult his article. He does make two very worthwhile suggestions, that you use 20-pound white bond paper and that you unlock one of the pin-feed mechanisms to prevent paper buckling. To give a greater depth of color for publication, I ran the paper through twice for each color, but generally this is not necessary.

Suppliers

B.T. Enterprises, 10 B Carlough Road, Bohemia, NY 11716
Ribbons in 5 colors for Epson, NEC and ProWriter.
Check-Mate, Box 103, Randolph, MA 02368
Ribbons in 6 colors for Epson, Radio Shack II and V, Okidata, and Paper Tiger.
Chromasette, Box 1087, Santa Barbara, CA 93102
Single issues $6.00 = $1.00 S&H
Custom Software Engineering, 807 Minutemen Causeway, Cocoa Beach, FL 32931
Alpha-Draw $8.95
Graphic Screen Print program $7.95 (LP VII/VIII, DMP-100/400)
$9.95 (others)
S&H for each order $1.00
Superior Graphic Software, 406 Little Mountain Road, Waynesville, NC 28786
MPP Tutorial, $34.95



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Software Review...

Wall Street Touted As Good Investment

I suppose that in the back of the minds of many of us is the dream of someday making a killing in the stock market, or watching a handful of dollar bills multiply into hundreds of thousands of bucks, of Swiss bank accounts, and of having the problem of figuring out how we're going to spend so much money. The reality for most of us, however, is that those few extra dollars are hard to find for us to get started on the road to riches.

Part of the beauty of *Wall Street* is that Valhalla Enterprises has been generous enough to provide each of us with $1,000 to get started. The rest is up to the individual and how he or she takes advantage of all the helpful information, such as stock and market histories and general trends that are part of the game. Individual hunches also are important, of course.

A couple of bars of "We're In The Money!" at the opening put us in an optimistic mood for what is a challenging, fascinating and colorful game. I would think that even those sleepy-looking elderly chaps who spend their lunch hours daily watching the big board would be caught up in this game.

Tailored for one to four players, *Wall Street* first asks for the names of the participants. The group is then asked for the amount of earnings that will determine the winner (if you want to play to $3,000, enter "3,000"). Actually, $3,000 is a short game for two people, taking between 10 and 20 minutes, depending upon their skill and luck. A $10,000 game probably will take four people about an hour if they move along at a good pace.

The stock exhange screen gives you the current price for eight stocks:

Utilities — Energetic Electric, Wishwashy Water;
Blue Chips — Mammoth Motors, Stupendous Steel;
Glamors — Calculating Computers, Albatross Aircraft;
High Risk — Pinchpenny Prospecting, Risky Research.

The current month is displayed in the upper righthand corner. The condition of the overall market is also shown (up, down or even). At the bottom of the screen is a list of possible actons: Pressing "P" lets you see your account along with your holdings and disposable income; the "S" key gives you stock history graphs, and "M" displays the market history.

An individual player's screen gives you the options of buying or selling. If you press "B" you are asked "Which Stock?" Typing the initial of the stock then gives you the history of that company's trends. A similar procedure is followed if you're selling.

After the round (or "month") of transactions is completed, be ready for some surprises because, just as in the real world, the stock market reacts to many other events, such as labor strikes and rumors of war. Then, of course, there are pleasant surprises, such as big dividends and 2-for-1 or 4-for-1 stock splits. You can just imagine the floor of the New York Stock Exchange when such excitement occurs.

Wall Street is an excellent game for teaching the ins and outs of the stock market, as well as the patience and knowledge required to give investments the opportunity to grow. It's also a good game to demonstrate CoCo's versatility. Warning: Like CoCo, the game also is contagious, and you should prepare yourself for hours of fun. *Wall Street* is a great investment!

(Valhalla Enterprises, P.O. Box 243, Sumner, WA 98390. $9.85 on tape, 16K required)

—Charles Springer

Hardware Review...

This Keyboard Is A Good Quality Product

We were a little concerned when the *Professional Keyboard* arrived with one page of documentation consisting of four short lines explaining how to install it. After all, something as complicated as replacing a keyboard should have all sorts of information, right?

Not to worry. Because the keyboard on the Color Computer is connected very simply, the installation was as easy as it looked. Total time was seven minutes, and some of that was due to the fact that we lost one of the screws to reattach the cover to CoCo.

Once in place, what we had, essentially, was a Model I keyboard in a Color Computer case. The fit was perfect. The touch was good and there were no real problems. As of this writing, the *Professional Keyboard* has been installed for the better part of three weeks with no trouble whatsoever.

It takes a bit of getting used to. But, if you are one of those people who is unhappy with the flat Color Computer keyboard, this product is a real gem.

The keys, of course, are higher than those for the Color Computer. And the *ENTER* key is located at a slightly different place. That took a little getting used to—but the touch-typists around have taken to the *Professional Keyboard* much like the proverbial duck to water.

It also has four function keys. Unfortunately, there is no documentation to tell you how to use them. We hope an addenda to the instructions will be forthcoming. And, of minor concern, it is obvious that keyboard overlays for some products such as the Platinum *Worksaver*, *Master Control* and *Basic Aid* will not fit this new keyboard. A small price to pay if you want to replace your keyboard.

We have heard more complaints about the Color Computer's keyboard than anything else. For those of you who do not like it, the *Professional Keyboard* offers an excellent alternative that is well put together and works without any problem.

You may notice that we refer to the "Color Computer" thoughout this review. The reason is that the *Professional Keyboard*, as of this writing, is not available for the TDP-100, nor for Color Computers with an "F" revision board. We understand, however, that one is in the works.

(Spectrum Projects, 93-15 86th Drive, Woodhaven, NY 11421, $89.95)

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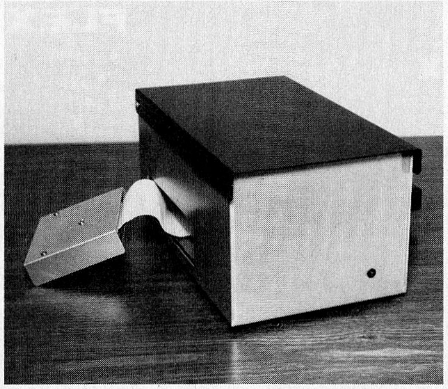
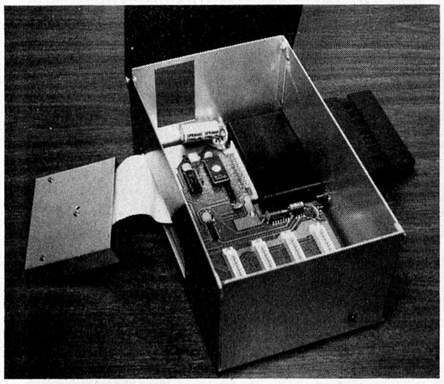
1. Here is Jeri plugging The Solution into the CoCo. Then she will move the main case up close to the CoCo. The cable is kept short to prevent noise and interference. The disk controller can be plugged into the side slot. The power supply plugs into a socket on the back of the case. All wires for the internal boards exit out the back of the case.

2. Here Jeri is setting the dip switches in The Solution. The hinged top makes the job easy. The switches can be set for three different things. Up to four boards can be installed inside the case.

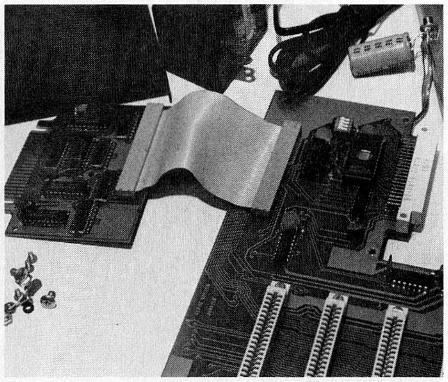
3. Here is The Solution at work. It makes a very nice addition to your CoCo with a black anodized top and a silver anodized main case both made from heavy aluminum stock.



4. Here's The Solution all by itself. The heavy aluminum anodized case is a thing to be proud of. The buffer board can be seen to the left of the main case. The LED indicator on the front comes on when you turn on the power to your CoCo. The Solution needs no on/off switch.



5. All that's missing from this picture is the plug in the wall power supply. You can see the 4K EPROM monitor and the 4 position dip switch. At the front are four of the five expansion slots with a disk controller plugged into the fifth slot on the side. The power LED is at the lower right front of the case.



6. Here's the real guts to The Solution. We took it all apart so that you could look at the parts. The 1 amp power supply can be seen in this picture. All the connectors are gold as you would expect. The small board is the buffer board. The white connectors are the same as the CoCo's.

THE SOLUTION AND WHY WE BUILT IT

When we first introduced FLEX for the CoCo in February 1982 we received hundreds of calls from software and hardware developers who wanted to use the CoCo because it was so inexpensive compared to everything else on the market. However there is not enough expansion or I/O in the CoCo to make this possible for most of these users. I know that the CoCo is viable in most cases, but for many, there needed to be more. So that was the original reason for designing the expansion box we call "THE SOLUTION."

The motherboard has the 2K/4K EPROM socket with a 4K monitor EPROM in it. Also inside are 4 vertical connectors for internally mounted boards or ROM type cartridges. The fifth connector is horizontal and is made for the disk controller, ROM cartridges or additional expansion out the side the of The Solution. A four position dip switch allows for 3 options to be selected. One option will cause the CoCo to get its interrupt and reset vectors from the monitor instead of RS Basic.

If you choose to come up in the monitor, then it is not necessary to have RS Extended Basic in the CoCo to boot FLEX because the monitor has a built-in boot. This saves $100.00 of the cost of The Solution. The power supply is a plug-in-the-wall type with a connector in the back of the case. The back of the case is open and it is thru this that all the cables for the different cards go. This makes for a very neat appearance.

TECHNICAL SPECIFICATIONS

*Bus Structure...*Fully buffered Color Computer compatible bus. Priority daisy chained arrangement where each slot has a priority assigned to it. The farther out on the bus that you are, the less priority you have. The disk slot (0) has the highest priority with slot 1, 2, 3, and then 4 has the lowest. The pinout and the timing is the same as the Color Computers with the exception of the sound line. This is used on the motherboard for the priority line.

*Power Supply...*The power supply is a tracking power supply which means that the Color Computer itself turns The Solution on and off so that there is no need for an on/off switch. A LED on the front of The Solution indicates when the entire system is on or off. The tracking power supply means that The Solution's bus voltage will be the same as the Color Computers to within a very few minnivolts. The power supply included with The Solution is a 1 amp supply for the 5 volt line only. The +12 and −12 voltages are taken from the Color Computer.

Dip switch options...

1) Select the 4K ROM monitor. When this option is selected, the system will come up in the monitor and get interrupt vectors from it rather than the Radio Shack Basic ROM. The reason you might want to do this is so you can boot FLEX from the monitor rather than Basic. This will allow running FLEX without have to have Extended Color Basic in the CoCo. This also ties in with the option on the serial card to come up on a terminal instead of the CoCo TV set and keyboard.

2) Disable the disk slot (0). This will allow using ROM cartridges in The Solution without unplugging the disk card. When the switch is on, the ROM is active. When it is off, whatever ROM cartridge is there is active. This infers that you could switch back and forth between a cartridge and the disk system. This is NOT necessarily true because of the need to initialize the disk software in the ROM and this may destroy what is in memory. It may be possible under special circumstances to do this but it is up to the user to work it out.

3) Select either a 2K or a 4K EPROM. This is set for a 4K EPROM which is included with The Solution. However, it can be changed if you have a need. The EPROM is addressed at $E000.

4) User definable. This means that we didn't use this switch for anything, but you can if you want, or we could call it 'reserved for future expansion.' This means that we don't have any use for it now, but we may in the future.

The Solution I/O cards are addressed at either the $FF60-$FFBF area OR the $FE00-$FEFF area.

These prices and specs are subject to change without notice. Call for confirmation.

THE SOLUTION (Price includes case and power supply.)	**$249.00**

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Note: We are considering several other cards for The Solution. Please let us know what you want, if there is enough interest, we will make it.

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6809 FLEX $198.00

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CC FLEX version: $149.00

(These business programs are also available for FLEX and OS-9. Please contact us for prices. All of these require Computerware's Random Basic.)

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The system collects name and address information and then provides mailing labels or reports of the entire list or subgroups within the list upon your request. You can add names, delete names, or change information for a given name at any time, keeping your list accurate at all times.

CC FLEX version: $149.00

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The Forgotten Aspect Of the Classroom Computer

By Dr. Paul Kimmelman
Assistant Superintendent
Norton (Ohio) City Schools

Educators are being inundated daily with advertisements from a whole host of computer dealers. These dealers include: computer hardware specialists, software specialists, and many resource book companies. Unfortunately, while educational computer purchasers are seriously reviewing computer hardware, software, and resource materials, an important aspect of future computer implementation is being forgotten—that is, what will the computers and peripheral equipment be placed on? Where will programs be stored? It should be noted that this may not be a major problem for schools at this time; however, individual classroom computers will more than likely eventually become part of a computer lab and furniture will be an important aspect of the design in the lab.

One company, Gusdorf Electronics Furniture, has designed a line of furniture that will more than meet the needs of public schools. In addition, Gusdorf has priced its equipment very reasonably considering some of the major advantages that it offers over several other comparably priced companies' products.

There is little doubt that computer furniture has not been given much thought while educators have been pressing to expand their hardware and software inventories. With equipment prices falling, however, we must begin to look at furniture as part of the plan to implement computer classes in school districts. The Gusdorf line will meet those needs through its carefully planned expandability options for a variety of classroom designs.

First, Gusdorf furniture is carefully packaged in order to prevent damage while being shipped. Once uncrated, the directions for assembly are written so that even the novice mechanic could put it together. What is even better is that assembly takes less than thirty minutes.

For schools, the design and appearance of the furniture are a major advantage. All of the furniture has a Paradise Hickory veneer which is very attractive. The wood panels which are primarily Appalachian Poplar will resist warping, splitting or cracking and are veneered with a heavy-gauge vinyl grain finish.

Table tops are made of formica which will also prevent scratches and marring. This is extremely critical for school use since students will often use the desks for writing as well.

Self-adhesive rubber accessories are packaged with Gusdorf furniture to combine wires and attach them to the back of the furniture. This is a convenience accessory in that it prevents many wires from merely dangling in the back of the furniture.

Storage is an exceptional component of the computer furniture line. For example, under the hutch desk unit is a shelf which can house the many notebooks, disks, cassettes, and manuals that the user wants to keep out of the way but easily accessible.

The hutch desk is spacious and designed to handle a complete computer set-up. For the Color Computer user, the hutch desk would enable the user to house the keyboard, monitor, and a cassette or two disk drives on it. In addition, a modem could be easily added on the top shelf next to the monitor.

For those desiring expanded furniture options, Gusdorf includes a credenza unit, printer stand, corner pieces, and expanders—all which can be attached to each other. These accessories all provide more work space and storage.

Now for one of the highlights of the Gusdorf line—prices. A computer hutch desk sells for approximately $170. The expanding units such as the credenza sells for $270. A printer stand is $140, and expanding table units run from $40 to $80. These prices are more than likely discounted by local dealers.

All of the Gusdorf furniture is sturdy and designed to support the equipment placed on it. One of the brochures from Gusdorf shows a monitor and printer on the top portion of the hutch while a keyboard and two disk drives are stored on the desk unit. Each of the assembly holes is reinforced to prevent excessive wear and tear.

Computer purchasers for schools will have to begin looking at computer labs for the future of computers in the curriculum. The Gusdorf line is certainly, at this time, the best answer to an attractive computer lab.

There are two suggestions for the Gusdorf designers that would help computer users. One would be to put a drawer in the desk unit, and two, allow for an option of wheels on all of the furniture instead of flat gliders.

In conclusion the main criteria for computer furniture, design, appearance, storage, expandability, and pricing have all been addressed by Gusdorf. There is no question but that furniture has become the forgotten portion of a computer plan, but through the new Gusdorf line we can all begin planning for when all of our Color Computers in the schools will be moved to a laboratory environment. In addition, home Color users will find that the Gusdorf Compu-Table can house almost all of the necessary equipment in a very small space and in a convenient manner.

Submitting Material To the Rainbow

Contributions to *the RAINBOW* are welcome from everyone. We like to run a variety of programs which will be useful/helpful/fun for other CoCo owners.

Program submissions must be on tape or disk and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs. All programs should be supported by some editorial commentary, explaining how the program works. We're much more interested in how your submission works and runs than how you developed it. Programs should be learning experiences.

We do pay for submissions, based on a number of criteria. Those wishing remuneration should *so state* when making submissions.

For the benefit of those who wish more detailed information on making submissions, please send a SASE to: Submissions Editor, *the RAINBOW*, P.O. Box 209, Prospect, KY 40059. We will send you some more comprehensive guidelines.

Please do not submit programs or articles currently submitted to another publication.

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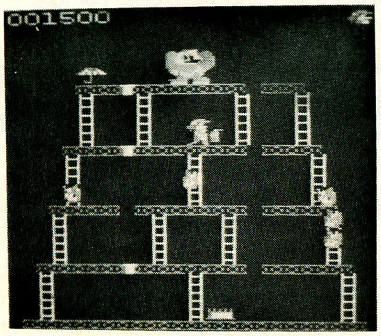

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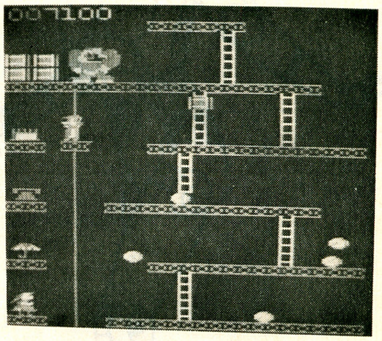

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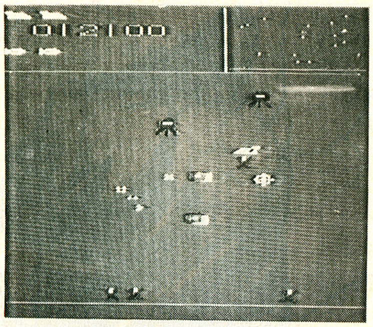

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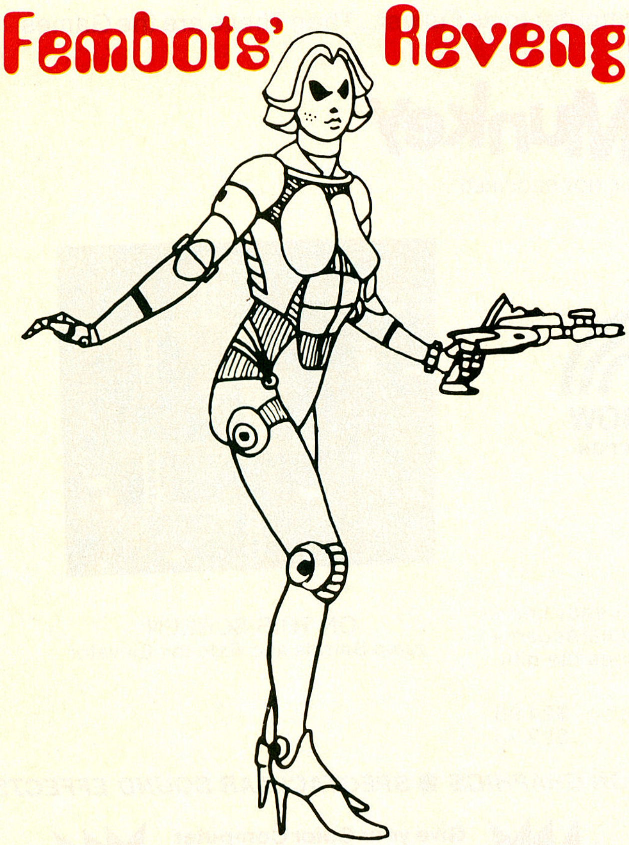

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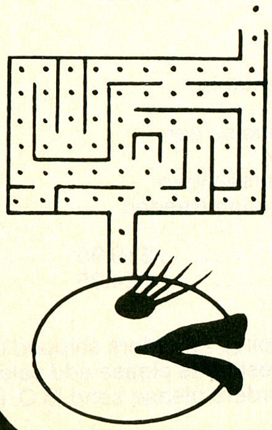

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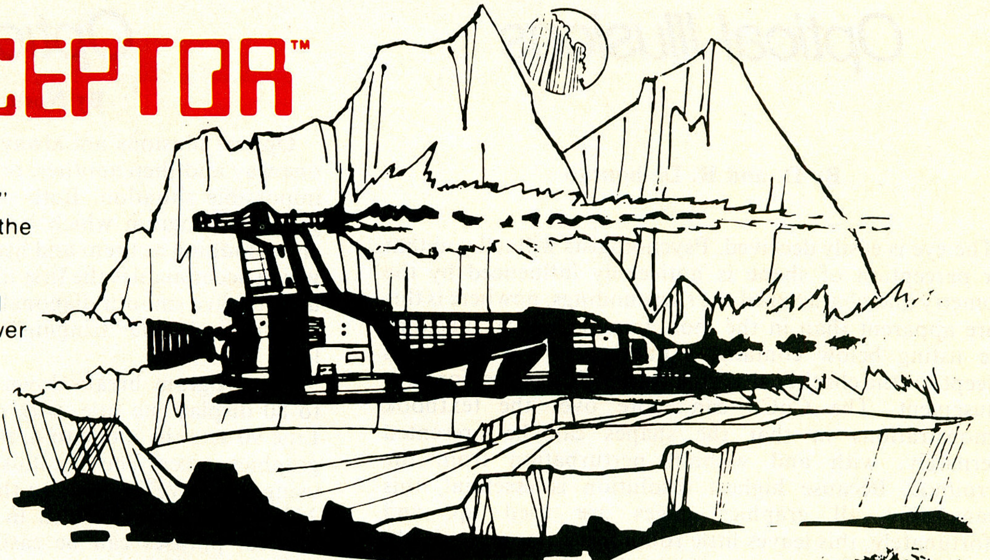

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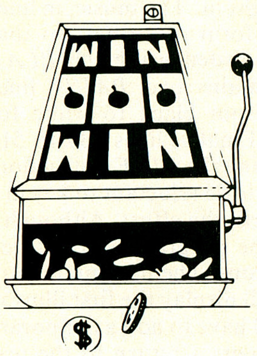

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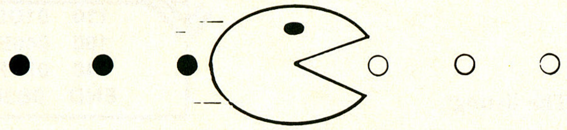

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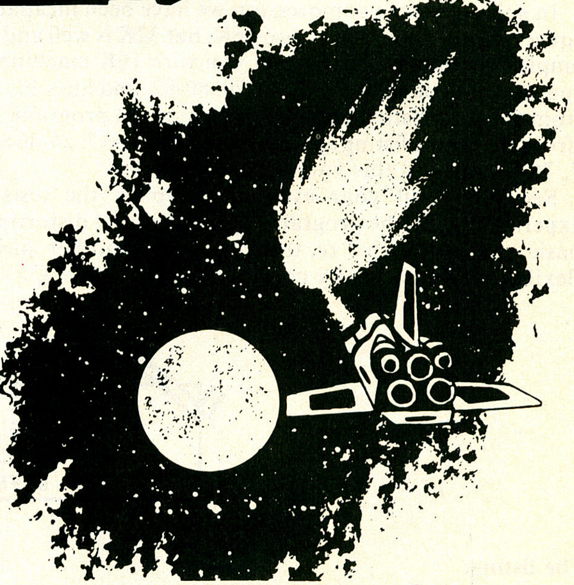

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TWO ILLUSIONS

Optical Illusions

By D. and R. Delbourgo

The eye is easily deceived. Psychologists will tell you that our perception of shape is noticeably influenced by the geometry and character of the surroundings: nowhere is this more apparent than in the most famous optical illusions. The listing below contains a number of such illusions (except for the checkered spirals and endless stairs) for your amusement. The CoCo can score over the textbook demonstrations in that the shapes can be presented alternately, with and without perturbation from the surrounds. Because highest resolution is essential, this means that all graphics pages are used up, and unfortunately, this leaves little room for the program itself.

In spite of severe compression we have been incapable of squeezing all the material into 16K, but 32K is well and truly ample. Therefore, for those of you with 16K machines, we suggest that you delete lines 47-70, 80-82, and lines 10, 18-22 from the total listing and call this your first program. Then (from the whole listing again) delete lines 13-17, 24-46 and 3-7, 76-79 and call this your second program.

See how well your eyes stand up to the tests and experiment with the programs by shifting and distorting the basic shapes relative to their settings—another piece of flexibility that comes by courtesy of the TRS-80C.

23	044E
40	0735
65	0BBC
END	0EFE

The listing:

```
1 DIMA(8):DIMB(14)
2 CLS0:C=159:FORJ=0TO11:FORK=0TO
480STEP32:POKE1034+J+K,C:NEXTK,J
:FORJ=1TO3:POKE1446+J,C:POKE1461
+J,C:NEXTJ
3 C=128:FORJ=1TO6:POKE1194+32*J,
C:POKE1205+32*J,C:NEXTJ:POKE1259
,C:POKE1268,C
4 DATA1029,1030,1049,1050,1065,1
078,1260,1267
5 FORJ=1TO8:READA(J):POKEA(J),15
6:NEXTJ
6 DATA1291,1292,1299,1300,1321,1
322,1333,1334,1415,1416,1417,143
```

(Continued on next page)

Optical 2

By Norman Latner

Optical illusions are always fascinating. First you see it one way and then another, or your eye is led to a seemingly impossible situation. Both of these effects appear in this graphics program which I call *Optical 2*. I'm sure you'll enjoy looking at them and listening to the Mozart selection which accompanies the first illusion. P Mode 4 graphics are used to give smooth diagonals, while the black/white color set with red/blue "fringing" add to the clean, crisp visual look.

The program breaks down in the following way. Lines 10 to 80 display the title, with alternating colors and sound. Line 90 sets the mode to 4, the screen to 1,1 and clears the graphics screen. The first illusion is drawn in lines 100 to 240 using the *LINE* instruction throughout. The music, in lines 250 to 420, is assembled in the form of strings, so that musical phrases can be easily repeated using the *PLAY* command. This section also contains two *PAINT* lines which change the background from black to white for another interesting visual effect. Finally, lines 430 to 510 draw the second illusion, again using the *LINE* instruction.

If you're like me, you may be a little reluctant to key in a program unless you know it's worth the effort. Although I can't give you any guarantees, the program is structured such that you can enter it in sections. The minimum entry would be lines 90 to 240 which will display the first illusion with a black background. You will have to add a temporary line: 245 GO TO 245. This prevents a return to the text screen. If you like what you see, add lines 430 to 510 for the second illusion. Line 245 should now be changed to: 245 FOR T = 1 TO 2500: NEXT T. This holds the first picture on the screen for a few seconds. To complete the program from this point, just add the missing lines, delete line 245 and enjoy.

110	01D0
180	046E
240	07BF
END	0B3D

The listing:

```
10 'OPTICAL2 - NORM LATNER-JAN 8
3*******************************
*
20 CLEAR5000:CLS0
30 FORX=1TO5:PRINT @ 204,"OPTICA
L";:PRINT @ 267,"ILLUSIONS";
40 FORT=1TO200:NEXTT:SOUND10*X,2
50 POKE359,13:SCREEN0,1
60 FORT=1TO200:NEXTT:SOUND35*X,2
70 SCREEN0,0:NEXTX
80 POKE359,126
90 PMODE4:PCLS:SCREEN1,1
100 LINE(71,52)-(71,27),PSET:LIN
```

(Continued on Page 31, Col. 2)

```
0,1431,1432
7 FORJ=1TO14:READB(J):POKEB(J),1
47:NEXTJ
8 PCLEAR8:PRINT@7,"OPTICAL  ILLU
SIONS";:PRINT@335,"BY";:PRINT@42
6,"r&d.delbourgo";:PRINT@456,"15
,willowdene av.";:PRINT@481,"hob
art,tasmania, australia7005";:PL
AY"L20O3CEGO4CO3GEC":GOSUB73
9 CLS0:PRINT@39,"OPTICAL ILLUSIO
NS";:PRINT@101,"(1) MULLER-LYER
     ";:PRINT@133,"(2) ZOLLNER L
INES     ";:PRINT@165,"(3) POGGEN
DORFF       ";:PRINT@197,"(4) PON
ZO-EHRENSTEIN ";:PRINT@229,"(5)
HERING-WUNDT       ";
10 PRINT@261,"(6) EBBINGHAUS
    ";:PRINT@293,"(7) PINCUSHION
EFFECT";:PRINT@325,"(8) ORBISON
          ";:PRINT@357,"(9) HERIN
G-SPRINGER  ";:PRINT@389,"(0) IM
POSSIBLE SHAPES";
11 PRINT@451,"PRESS YOUR CHOICE
NUMBER ";:PRINT@483,"PRESS R TO
RETURN TO MENU";
12 I$=INKEY$:IFI$=""THEN12
13 IFI$="1"THEN24
```

```
14 IFI$="2"THEN30
15 IFI$="3"THEN35
16 IFI$="4"THEN39
17 IFI$="5"THEN42
18 IFI$="6"THEN47
19 IFI$="7"THEN52
20 IFI$="8"THEN55
21 IFI$="9"THEN58
22 IFI$="0"THEN62
23 GOTO12
24 GOSUB71:LINE(78,75)-(178,75),
PSET:LINE(78,125)-(178,125),PSET
25 DRAW"BM78,75C0H8BD16E8":DRAW"
BM178,75C0E8BD16H8"
26 DRAW"BM86,125C0BU8G8F8":DRAW"
BM170,125C0BU8F8G8":GOSUB73
27 GOSUB75:DRAW"BM78,75C1H8BD16E
8":DRAW"BM178,75C1E8BD16H8"
28 DRAW"BM86,125C1BU8G8F8":DRAW"
BM170,125C1BU8F8G8":GOSUB73
29 GOSUB75:GOTO24
30 GOSUB71:GOSUB76
31 FORJ=0TO128STEP64:FORK=J+8TO1
84STEP8:LINE((K-J)*4/3-10,K)-((K
-J)*4/3+10,K),PSET:NEXTK:FORK=8T
O184-J STEP8:LINE((K+J)*4/3-10,K
)-((K+J)*4/3+10,K),PSET:NEXTK
32 FORK=J+40TO184STEP8:LINE(K*4/
3,K-J-40)-(K*4/3,K-J-24),PSET:NE
```

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REQUIRES 16K EXT. BASIC $14.95

SPELLING TEST is designed to give a standard oral spelling test using the audio track of the computer's tape recorder to dictate test words and sample sentences. Student responses are typed on the keyboard and checked by the computer. Results are displayed on the screen and (if connected) on a printer. **REQUIRES 16K EXT. BASIC $19.95**

MATH DRILL is a program designed to help children to practice addition, subtraction, multiplication, and division skills on the COLOR COMPUTER. It has several features that make its use particularly attractive.
- Up to 6 students may use the program at the same time.
- Answers for addition, subtraction and multiplication are entered from right to left, just as they are written on paper.
- Commas may be included in the answers.
- Partial products for the multiplication problems may be computed on the screen.
- Division answers that have a remainder are entered as a whole number followed by the letter "R" and the remainder.
- There are ten, user modifiable, skill levels.
- A "SMILEY FACE" is used for motivation and reward. Its size increases relative to the skill level.
- Skill levels automatically adjust to the student's ability.
- A timer measures the time used to answer each problem and the total time used for a series of problems.
- After a problem has been answered incorrectly the correct answer appears under (above in division) the incorrect answer.

REQUIRES 16K EXT BASIC $19.95

WORD DRILL is designed to give a multiple choice vocabulary quiz. Words and definitions are entered into the program from the keyboard or from a tape file. The computer displays a randomly chosen definition and eight word choices. The student must enter his response before a built in timer reaches zero.
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ESTIMATE is a program designed to help children to practice estimating the answers to addition, subtraction, multiplication and division problems on the COLOR COMPUTER. It has many features that make its use particularly attractive:
- Up to 5 students may use the program at the same time.
- There are 5, user modifiable, skill levels.
- The acceptable percent error may be changed as a student's skill improves.
- A timer measures the number of seconds used to answer each problem and the total time used for a series of problems.
- If a problem has been answered incorrectly, the student is told the percent error and asked to try again.
- If a problem is answered incorrectly a second time, the student is told the correct answer and the range of acceptable answers is displayed.
- A report is given at the end of each set of problems that includes the number of problems done, the number of problems answered correctly on the first try and the average percent error.
- The (BREAK) key has been disabled so that a child will not inadvertently stop the program from running.

16K EXT. BASIC $19.95

TEACHERS' DATABASE is a program designed to allow a teacher to keep a computerized file of information about his/her students. There are many features that make this program particularly attractive.
- Information on as many as 100 students (or more) may be in the computer at one time.
- Each student may have as many as 20 (or more) individual items of data in his/her record.
- The program will run from cassette or disk.
- Cassette and disk files are completely compatable.
- The program is menu driven.
- Records may be easily changed, deleted, combined or added.
- Information about students may be numerical or text.
- Records may be quickly alphabetized.
- Records may be sorted by various criteria.
- Records may be reordered (ranked) based on test scores or other data.
- Data displayed during a sort may be printed on a printer or saved on disk or cassette as a new file.
- A full statistical analysis of data may be done and sent to the printer.
- Student test scores may be weighted.

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XTK:FORK=8TO152-J STEP8:LINE(K*4
/3,K+J+24)-(K*4/3,K+J+40),PSET:N
EXTK:NEXTJ
33 GOSUB72:GOSUB76
34 GOSUB74:GOSUB75:GOTO34
35 GOSUB71:GOSUB77
36 LINE(167,38)-(193,146),PSET,B
F:LINE(203,38)-(229,146),PSET,BF
:LINE(45,38)-(71,146),PSET,BF
37 GOSUB72:GOSUB77
38 GOSUB74:GOSUB75:GOTO38
39 GOSUB71:FORI=0TO96STEP16:LINE
(0,I)-(256,96),PSET:LINE-(0,192-
I),PSET:NEXTI:GOSUB78
40 GOSUB72:GOSUB78
41 GOSUB74:GOSUB75:GOTO41
42 GOSUB71:GOSUB79:GOSUB73
43 FORI=0TO256STEP32:LINE(I,0)-(
256-I,192),PSET:NEXTI:FORJ=15TO6
0STEP15:LINE(0,J)-(256,192-J),PS
ET:LINE(0,192-J)-(256,J),PSET:NE
XTJ
44 GOSUB72:GOSUB79
45 FORI=0TO256STEP16:LINE(128,0)
-(I,96),PSET:LINE-(128,192),PSET
:NEXTI
46 GOSUB74:GOSUB75:GOTO46
47 GOSUB71:GOSUB80
48 CIRCLE(88,76),7,0:CIRCLE(88,1
16),7,0:FORX=0TO32STEP32:FORY=0T
O20STEP20:CIRCLE(72+X,86+Y),7,0:
NEXTY,X
49 CIRCLE(168,64),15,0:CIRCLE(16
8,128),15,0:FORX=0TO52STEP52:FOR
Y=0TO30STEP30:CIRCLE(142+X,81+Y)
,15,0:NEXTY,X
50 GOSUB72:GOSUB80
51 GOSUB74:GOSUB75:GOTO51
52 GOSUB71:GOSUB81:GOSUB73
53 GOSUB72:FORR=1TO10:CIRCLE(128
,96),150*R/(9+R):NEXTR:GOSUB81
54 GOSUB74:GOSUB75:GOTO54
55 GOSUB71:GOSUB82:GOSUB73
56 GOSUB72:FORI=0TO10:LINE(128,7
*I)-(7*I,192-4*I),PSET:LINE-(128
,150-7*I),PSET:LINE-(256-7*I,192
-4*I),PSET:LINE-(128,7*I),PSET:N
EXTI:GOSUB82
57 GOSUB74:GOSUB75:GOTO57
58 GOSUB71:FORX=5TO250STEP14:FOR
Y=5TO185STEP14
59 LINE(X-2,Y-2)-(X+2,Y+2),PSET,
BF:LINE(X+5,Y+5)-(X+9,Y+9),PSET,
BF:NEXTY,X:GOSUB73
60 GOSUB72:FORX=5TO250STEP14:FOR
Y=5TO185STEP14:LINE(X-4,Y-4)-(X+
4,Y+4),PSET,BF:NEXTY,X
61 GOSUB74:GOSUB75:GOTO61
62 GOSUB71:LINE(76,48)-(246,48),
PSET:LINE-(246,68),PSET:LINE-(76
,68),PSET:LINE(246,68)-(176,148)
,PSET:LINE-(6,148),PSET
63 LINE(6,128)-(156,128),PSET:LI
NE-(192,88),PSET:LINE-(40,88),PS
ET:LINE(40,108)-(156,108),PSET:L
INE-(176,88),PSET:LINE(156,108)-
(156,128),PSET
64 CIRCLE(76,58),5,0,2:CIRCLE(40
,98),5,0,2:CIRCLE(6,138),5,0,2
65 GOSUB72:LINE(129,101)-(104,89
),PSET:LINE-(63,108),PSET:LINE-(
56,50),PSET:LINE-(95,32),PSET:LI
NE-(104,89),PSET
66 LINE(91,106)-(109,115),PSET:L
INE-(118,179),PSET:LINE-(163,158
),PSET:LINE-(156,94),PSET:LINE-(
109,115),PSET
67 LINE(130,104)-(128,80),PSET:L
INE(89,96)-(93,121),PSET:LINE(95
,32)-(168,62),PSET:LINE(118,179)
-(49,139),PSET
68 LINE(160,128)-(177,122),PSET:
LINE-(168,62),PSET:LINE-(128,80)
,PSET:LINE-(156,95),PSET:LINE(58
,72)-(41,81),PSET:LINE-(49,138),
PSET:LINE-(92,121),PSET:LINE-(63
,108),PSET
69 LINE(58,72)-(41,81),PSET:LINE
```

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```
-(49,138),PSET:LINE-(92,121),PSE
T:LINE-(63,108),PSET
70 GOSUB74:GOSUB75:GOTO70
71 PMODE4,1:PCLS1:SCREEN1,1:COLO
R0,5:RETURN
72 PMODE4,5:PCLS1:SCREEN1,1:COLO
R0,5:RETURN
73 FORT=1TO2000:NEXTT:RETURN
74 FORP=1TO5STEP4:PMODE4,P:SCREE
N1,1:FORT=1TO2000:NEXTT,P:RETURN
75 IFINKEY$="R"THEN9ELSERETURN
76 FORI=0TO192STEP32:LINE(I*4/3,
0)-(256,192-I),PSET:LINE(0,I)-(2
56-4*I/3,192),PSET:NEXTI:RETURN
77 LINE(18,22)-(98,162),PSET:LIN
E(158,22)-(238,162),PSET:RETURN
78 CIRCLE(168,96),31,0:CIRCLE(88
,96),31,0:LINE(120,66)-(136,126)
,PSET,B:LINE(200,66)-(216,126),P
SET,B:RETURN
79 LINE(0,72)-(256,120),PSET,B:L
INE(0,0)-(256,192),PSET,B:RETURN
80 CIRCLE(88,96),10,0:CIRCLE(168
,96),10,0:RETURN
81 LINE(88,56)-(168,136),PSET,B:
RETURN
82 CIRCLE(128,96),40,0:RETURN
```

(Continued from Page 28)

```
E(71,27)-(96,14),PSET:LINE(96,14
)-(119,27),PSET:LINE(119,27)-(11
9,40),PSET:LINE(119,40)-(108,46)
,PSET:LINE(108,46)-(108,72),PSET
110 LINE(108,59)-(96,64),PSET:LI
NE(96,64)-(71,52),PSET:LINE(71,2
7)-(96,40),PSET:LINE(96,40)-(119
,27),PSET:LINE(96,40)-(96,64),PS
ET
120 LINE(84,58)-(71,64),PSET:LIN
E(71,64)-(71,90),PSET:LINE(71,90
)-(96,103),PSET:LINE(96,103)-(11
9,90),PSET
130 LINE(119,90)-(119,78),PSET:L
INE(108,72)-(132,84),PSET:LINE(1
08,72)-(96,78),PSET:LINE(96,78)-
(71,64),PSET
140 LINE(96,78)-(96,103),PSET:LI
NE(84,96)-(71,103),PSET:LINE(71,
103)-(71,128),PSET:LINE(71,128)-
(96,140),PSET
150 LINE(96,140)-(119,128),PSET:
LINE(119,128)-(119,103),PSET:LIN
E(119,103)-(108,96),PSET:LINE(96
,116)-(96,140),PSET
160 LINE(119,103)-(96,116),PSET:
LINE(96,116)-(71,103),PSET:LINE(
84,134)-(71,141),PSET:LINE(71,14
```

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```
1)-(71,167),PSET
170 LINE(71,167)-(96,180),PSET:L
INE(96,180)-(119,167),PSET:LINE(
119,167)-(119,141),PSET:LINE(119
,141)-(108,134),PSET
180 LINE(119,154)-(132,160),PSET
:LINE(132,160)-(156,148),PSET:LI
NE(156,148)-(156,122),PSET:LINE(
156,122)-(132,110),PSET:LINE(132
,110)-(119,116),PSET:LINE(132,16
0)-(132,134),PSET
190 LINE(156,136)-(167,141),PSET
:LINE(167,141)-(190,128),PSET:LI
NE(190,128)-(190,103),PSET:LINE(
190,103)-(167,91),PSET:LINE(167,
91)-(144,103),PSET:LINE(144,103)
-(167,116),PSET
200 LINE(167,116)-(167,141),PSET
:LINE(144,103)-(144,116),PSET:LI
NE(167,116)-(190,103),PSET:LINE(
190,116)-(202,122),PSET:LINE(202
,122)-(226,110),PSET:LINE(226,11
0)-(226,84),PSET:LINE(226,84)-(2
02,72),PSET
210 LINE(202,72)-(177,84),PSET:L
INE(177,84)-(177,96),PSET
220 LINE(177,84)-(202,98),PSET:L
INE(202,98)-(226,84),PSET:LINE(202,98)-(202,122),PSET:LINE(190,6
6)-(190,78),PSET:LINE(190,66)-(1
67,53),PSET:LINE(167,53)-(144,66
),PSET:LINE(144,66)-(144,90),PSE
T:LINE(144,90)-(156,96),PSET
230 LINE(144,66)-(167,78),PSET:L
INE(167,78)-(190,66),PSET:LINE(1
67,78)-(167,91),PSET:LINE(132,84
)-(144,78),PSET:LINE(156,59)-(15
6,46),PSET:LINE(156,46)-(132,33)
,PSET:LINE(132,33)-(119,40),PSET
:LINE(108,46)-(132,59),PSET
240 LINE(132,59)-(156,46),PSET:L
INE(132,59)-(132,84),PSET:LINE(7
1,141)-(96,154),PSET:LINE(96,154
)-(96,180),PSET:LINE(96,154)-(11
9,141),PSET:LINE(119,128)-(132,1
34),PSET:LINE(132,134)-(156,122)
,PSET
250 A$="V10O3L8FO3L8GO3CP100O3C"
260 B$="O3L8DO3L8FO2B-P100B"
270 C$="L8AO3L8CO2FP100E"
280 D$="L2EF"
290 E$="V20L8CL8EGP100G"
300 F$="L8CL8FAP100A"
310 G$="L8CL8EL8GB-P100AP100"
320 H$="L2AV15G"
330 I$="V10O3L8CO3L8E-O2AP100AL8
B-O3L8DO2GP100GL8AO3L8CO2F+P100F
+L2F+G"
340 J$="V20L8B-O3L8DO2GP100O2GL8
AO3L8CO2FP100O2F"
350 K$="L8GB-EP100EP100L2EV15E"
360 L$="V15L2AV10G"
370 PLAYA$+B$+C$+D$+E$+F$+G$+H$
380 PAINT(128,96),5,5
390 PAINT(28,90),5,5
400 PLAYI$+J$+K$+A$
410 PLAYG$+L$
420 PLAYA$+B$+C$+D$
430 PCLS:LINE(38,48)-(180,48),PS
ET:LINE(38,64)-(168,64),PSET:LIN
E(168,64)-(168,80),PSET
440 LINE(168,80)-(70,80),PSET:LI
NE(168,80)-(184,96),PSET:LINE(20
0,96)-(70,96),PSET
450 LINE(92,112)-(244,112),PSET:
LINE(244,112)-(244,128),PSET:LIN
E(244,128)-(92,128),PSET
460 LINE(244,112)-(180,48),PSET:
LINE(152,48)-(200,96),PSET:LINE(
204,72)-(236,72),PSET
470 LINE(236,72)-(252,88),PSET:L
INE(252,88)-(252,96),PSET:LINE(2
52,88)-(220,88),PSET:LINE(252,96
)-(228,96),PSET
480 CIRCLE(38,56),8
490 CIRCLE(70,88),8
500 CIRCLE(92,120),8
510 GOTO510
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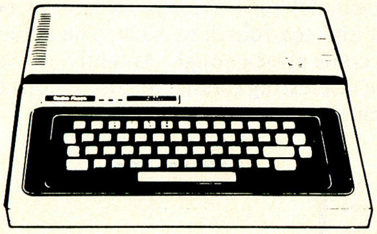

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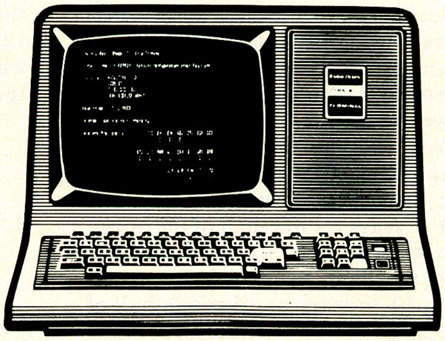

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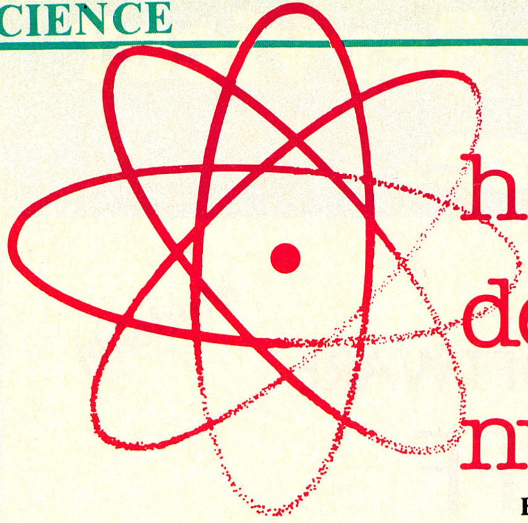


half–life demonstration of nuclear decay

By David C. Lengyel

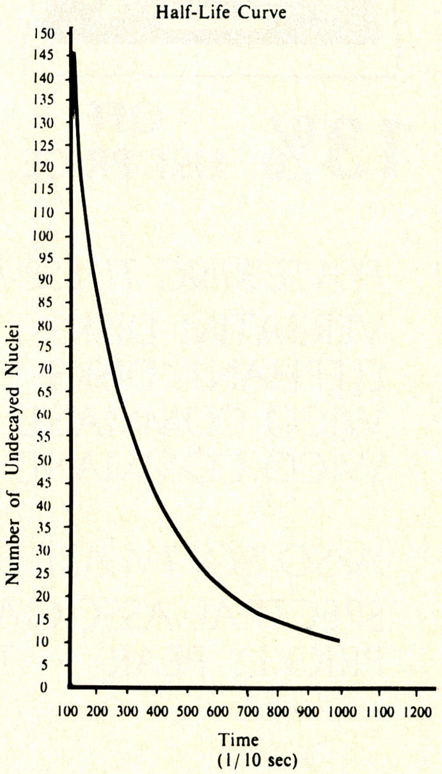
The concept of half-life is widely taught in several fields of physical science. It is used to explain the rate at which various unstable atomic nuclei decay or change by emitting particles and energy and are thus transformed into different nuclei. For example, uranium ^{238} is unstable and changes through nuclear decay into lead. Not all of the original nuclei change at once, however. In fact, this is far from what actually happens. The decay of any individual unstable nuclei is a random event, and thus impossible to predict with any degree of accuracy. In the case of uranium ^{238}, we do know that it takes 4.5 x 10^{9} years for one-half of the nuclei to decay to become lead. After another 4.5 x 10^{9} years, one-half of the remaining uranium ^{238} nuclei decay and after a third interval of 4.5 x 10^{9} years, another one-half of the uranium ^{238} nuclei decay and so on. Therefore, the time interval in which one-half of a sample of unstable atomic nuclei decays is called the half-life. Each type of radioactive substance has its own half-life which can vary from a fraction of a second to billions of years.

This program for the Color Computer illustrates the random process of nuclear decay and shows how, through a random process, the half-life comes to be. Initially, 144 blue rectangles are set on the screen, using the low resolution set-reset procedure. Extended Basic's TIMER function is used as a time counter. Each blue dot (rectangle) represents an unstable atomic nuclei of a particular imaginary element. The X and Y coordinates of each dot are stored in arrays. The computer then looks at each point individually and through the RND function decides whether or not the nuclei will decay. If it does decay, then the dot is changed to red. When one-half of the nuclei have decayed, 72 in this case, then the half-life interval is displayed. When half of the remaining nuclei decay, the second half-life time is shown, and so on, up to the fourth half-life.

When the program is *RUN*, you are asked to *INPUT* a time factor. This can be a number from 2 to about 30. Higher numbers may cause the TIMER to reset. A small number produces a shorter half-life period.

The first number displayed at the right of the screen is identified as the half-life and the subsequent displays are labeled second, third and fourth half-life. These are cumulative *timer* values and should be even multiples of the half-life (two times, three times and four times). The first half-life is displayed when 72 nuclei decay, the second when 36 more decay, the third when 18 more decay and the fourth when nine more decay.

Since 144 points do not represent a truly large sample size, the results do not always give half-life periods that are the same. For example, if the first half-life is at 250 counts (about 25 seconds) then the second should be at 500, the third at 750 and the fourth at 1000. The actual results will vary but do come close enough. Actually, the variability can lead to some interesting classroom discussions on the idea of random events.



Lines 50-128	Stores point locations in arrays X and Y
Lines 140-160	Asks for time intervals
Lines 175-200	Displays all points as blue
Line 210	Sets TIMER to 0
Line 220	Displays time counts (about one-tenth seconds)
Line 230	Selects a random point to check
Line 235	Checks if point already set
Line 237	Decides if decay takes place
Lines 240-257	Checks for half-life intervals

The listing:

```
104  0246
200  050A
END  074D
```

```
40 ' BUILD ARRAYS
50 DIM X(144),Y(144)
60 FOR I=1 TO 144
70 READ X(I),Y(I)
80 NEXT I
90 DATA 0,1,5,1,10,1,15,1,20,1,2
5,1,30,1,35,1,40,1,45,1
92 DATA 0,3,5,3,10,3,15,3,20,3,2
5,3,30,3,35,3,40,3,45,3
94 DATA 0,5,5,5,10,5,15,5,20,5,2
5,5,30,5,35,5,40,5,45,5
100 DATA 0,7,5,7,10,7,15,7,20,7,
25,7,30,7,35,7,40,7,45,7
102 DATA 0,9,5,9,10,9,15,9,20,9,
25,9,30,9,35,9,40,9,45,9
104 DATA 0,11,5,11,10,11,15,11,2
0,11,25,11,30,11,35,11,40,11,45,
11
110 DATA 0,13,5,13,10,13,15,13,2
0,13,25,13,30,13,35,13,40,13,45,
13
112 DATA 0,15,5,15,10,15,15,15,2
0,15,25,15,30,15,35,15,40,15,45,
15
114 DATA 0,17,5,17,10,17,15,17,2
0,17,25,17,30,17,35,17,40,17,45,
17
116 DATA 0,19,5,19,10,19,15,19,2
0,19,25,19,30,19,35,19,40,19,45,
19
120 DATA 0,21,5,21,10,21,15,21,2
0,21,25,21,30,21,35,21,40,21,45,
21
122 DATA 0,23,5,23,10,23,15,23,2
0,23,25,23,30,23,35,23,40,23,45,
23
124 DATA 0,25,5,25,10,25,15,25,2
0,25,25,25,30,25,35,25,40,25,45,
25
126 DATA 0,27,5,27,10,27,15,27,2
0,27,25,27,30,27,35,27,40,27,45,
27
128 DATA 0,29,5,29,10,29,15,29
140 'INPUT HALF LIFE TIME VARIAB
LE *******
150 CLS:PRINT TAB(7)"ENTER TIME
FACTOR"
160 INPUT H
170 CLS(0)
175 ' *** SET ALL DOTS BLUE ***
180 FOR I=1 TO 144
190 SET(X(I),Y(I),3)
200 NEXT I
205 ' *** MAIN ROUTINE ***
210 TIMER=0
220 PRINT@493,"TIME="INT(TIMER/6
);
230 I=RND(144)
235 IF POINT(X(I),Y(I))=4 THEN P
RINT@493,"TIME="INT(TIMER/6);:GO
TO240
237 R=RND(H):IF R<>1THEN220 ELSE
 N=N+1:PRINT@56,"X="N;:SET(X(I),
Y(I),4):PRINT@493,"TIME="INT(TIM
ER/6);:IF N=144 THEN 370 ELSE 24
0
240 IF N=72 AND F<1 THEN SOUND10
0,1:F=1:PRINT@120,"HALF ";:PRINT
@152,"LIFE ";:PRINT@184,INT(TIME
R/6);
250 IF N=108 AND F<2 THEN SOUND
150,1:F=2:PRINT@216,"2ND HALF";:
PRINT@248,"LIFE      ";:PRINT@280,
INT(TIMER/6)
255 IF N=126 AND F<3 THEN SOUND
200,1:F=3:PRINT@312,"3RD HALF";:
PRINT@344,"LIFE      ";:PRINT@376,
INT(TIMER/6)
257 IF N=135 AND F<4 THEN SOUND2
50,1:F=4:PRINT@408,"4TH HALF";:P
RINT@440,"LIFE      ";:PRINT@472,I
NT(TIMER/6)
330 GOTO220
370 GOTO 370
```

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Software Review...

Homebase: Complex, Versatile Data Management

By Frank J. Esser

The purpose of a database program, or system, is to provide a means to store data in such a manner that the user of the system is not required to know where or how the data is stored. His only concern is that indeed it is stored. To this end, many database systems have been written for large and small computers. Some are easy to use, some are hard to use and then there are some that are downright painful to use. *Homebase* is a program which has been designed to serve as both a database manager and a text/word processor. *Homebase* is written for a 32K Color Computer with Extended BASIC and a disk operating system. The programs are set up to handle the characteristics of either Radio Shack LPVII/LPVIII or Epson printers. I have a Radio Shack LPVII printer and experienced no trouble with it at all.

The entire *Homebase* system comes enclosed in a three-ring binder. The documentation is subdivided by functions with each of the system menus receiving its own divided section. The documentation is clearly laid out and easy to read. The diskette is enclosed in a pocket, specifically designed for this purpose, inside the front cover. Also enclosed is a separate seven-page document which gives a brief overview of the system and the best manner with which to become familiar with it. The documentation was produced on a matrix printer with free use made of the elongated print and overstrike features. The entire package is very nicely done and is impressive in its format. There are three examples in the first chapter which are designed to help the new user become familiar with the programs. The programs are not hard to use once one becomes familiar with them. But because of the complexity of the operations and the interaction of the commands, it does require a considerable amount of experimentation before one feels comfortable enough to start serious data entry. This degree of experimentation is not unusual for a program of this type. If you are looking for a program you can setup and start entering data into the same day, this is not the one for you. But, if you want a program that will give you the option of user-defined file parameters, report formatting at the time the report is generated, searches through the data base on file defined items, by value, and do not want to worry about excessive disk accesses because you are expanding a sequential file, then this is the program for you. The examples provide a good start, but are lacking in a good explanation of the interaction of the commands used in them. Good documentation is ever so important. It is the communication link between the producer and the user and needs to be clear and to the point. I found the documentation package with *Homebase* to be lacking in only one aspect. On those pages where many options were described, it would have improved the readability if a black line was inserted between each of the option descriptions.

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The system is broken down into two distinct sections: the text/word processor section and the database section. I will cover each section individually. The system as a whole leaves something to be desired. It requires that, once the program is run and exited, it cannot be rerun without recycling power. I am hard pressed to determine why a program has to be designed with such constraints. I tried running several of my standard programs and routines after running *Homebase* and all appeared to be in order. But just the warning leaves me with an uncomfortable feeling. I have many years of experience with computer systems in the hardware/software field. One of the major causes of system failures, even in this age of integrated circuits, is unnecessary power cycling. It bothers me when a program is written in a manner that the system is left in such a state that power must be cycled to restore it to a fully usable condition.

The text processing section is menu driven, as is the whole system. The text processor builds a text file by forming a group of not more than 250 text records. Each record may consist of a maximum of 480 characters, 15 lines at 32 characters per line. Each record block is given a name. It is through this name that the blocks can be later recalled. The record block parameters are specified at the time the file is created and are stored with the file for future reference.

The processing functions available offer all the general utilities such as adding, deleting, updating and displaying the records. During the building of a record block, compressed, double width, overstrike, and emphasized printer control codes are available as imbedded characters in the text. The format codes are generated by single key commands and are very easy to use. Also available are new line, new page, stop printing and tab sets. The important point to remember here is that all processing is done at the record block level. You can put a document together in any manner you choose by simply manipulating the record blocks. Individual blocks can be selected, reordered, changed or sorted before printing. All of this can be done without affecting the data stored on disk. Suppose that you wanted to print a document that would consist of record blocks one and five. Using the "select" function, record blocks one and five are collected. Then using the *PRINT*

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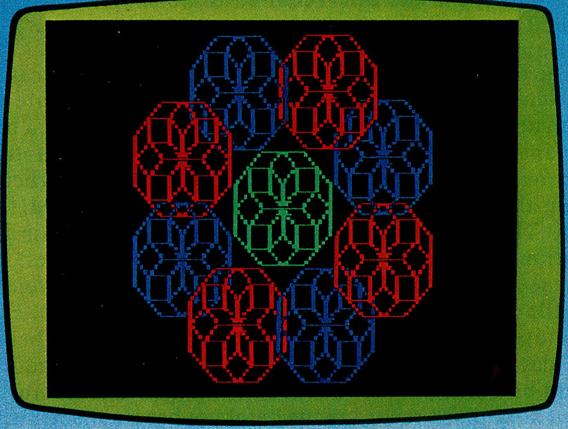

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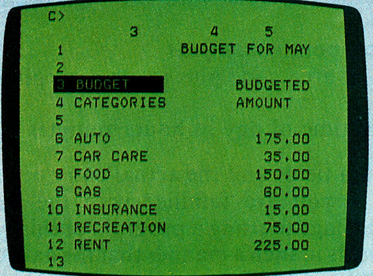

```
C>
          3          4    5
 1                   BUDGET FOR MAY
 2
 3 BUDGET                 BUDGETED
 4 CATEGORIES             AMOUNT
 5
 6 AUTO                     175.00
 7 CAR CARE                  35.00
 8 FOOD                     150.00
 9 GAS                       60.00
10 INSURANCE                 15.00
11 RECREATION                75.00
12 RENT                     225.00
13
```

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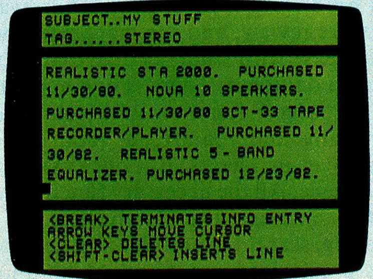

```
SUBJECT..MY STUFF
TAG......STEREO

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30/82.  REALISTIC 5 - BAND
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<BREAK> TERMINATES INFO ENTRY
ARROW KEYS MOVE CURSOR
<CLEAR> DELETES LINE
<SHIFT-CLEAR> INSERTS LINE
```

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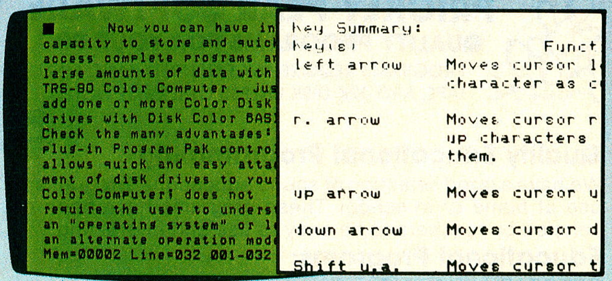

```
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require the user to unders
an "operating system" or l
an alternate operation mod
Mem=00002 Line=032 001-032
```

```
Key Summary:
Key(s)                 Funct
left arrow      Moves cursor l
                character as c

r. arrow        Moves cursor r
                up characters
                them.

up arrow        Moves cursor u

down arrow      Moves cursor d

Shift u.a.      Moves cursor t
```

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command, they are printed. You then have the option to discard those blocks just manipulated and start all over again. Or you can add more records to those already selected and repeat the entire process. There are some disadvantages to performing text processing in this manner. If you are familiar with a standard text/word processor, then beware, because *Homebase* does not function in the same manner. Perhaps its biggest drawback is its apparent inability to properly format on the screen how an actual page will look when printed. The program handles upper/lower case in a manner identical to BASIC. That is, lower case characters are represented by reverse video. *Homebase* will create documents of good quality if you are willing to spend the time required to manually format the separate record blocks. There exists what I consider a serious flaw in the printing function. The printing process allows the user to set the right margin. The manual does spell out the rules for handling the right margin. When the right margin is encountered, a new line is started when the word being processed ends. If the word is longer than the document width, then the word is broken and the remainder is carried forward to the next line. The more expensive word processors generally handle this problem by doing a look ahead. If any part of the last word in the present line lies on the right margin it will insert enough double spaces into the line to cause the end of the preceding word to be in the last column. For those printers with proportional spacing, the word processor will adjust the spaces evenly between the words on that line to get the same effect. Some of the less expensive word processors will simply pick up the entire word and carry it forward to the next line. This leaves a more ragged edge, but the document is clearly readable. *Homebase* only has this problem when the right margin is specified to close to the actual form width. Another minor problem occurs when the print option is exercised and the printer head is not at the home position. It seems that a carriage return (cr) is not sent to the printer prior to the printing of the first record, thus the first line is started wherever the print head was last used and that may not be the left margin. The text processor does perform as advertised and will produce good documentation if you are willing to spend the time required to do so. After years of using a word processor, I do not feel *Homebase* is a good substitute.

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The database section of *Homebase* is menu driven as are all elements of the system. For those of you who are not familiar with database managers, I would like to offer a brief explanation of how they function. A database system stores data in a record/field structure, the primary data structure being the file. The secondary structure is the record/field pair. The most commonly used example to explain this relationship is a file cabinet containing sales invoices. The file cabinet is equivalent to the disk file. Each sales invoice in the file is equivalent to a record in the database file. Each separate entity on the sales invoice corresponds to a field in the database record. The customer's name and address could be a field as well as the date, the type and number of items sold. Each record in the database has a name attached to it. In the case of our file cabinet, the customer's last name could become the record name and correspond to a file folder in the cabinet. Seem confusing? Well, the first couple of times around it will be, but don't let it scare you. If I can learn it, anyone can. Now with this information in hand, let's proceed. *Homebase* allows for the definition of 50 fields in each record and a maximum of 250 records per file. The type of definitions which are allowed are:

A) Amount, treated as a dollar amount
C) Code, can consist of any five characters
I) Identification, consists of nine place integer
O) Other, is a nine digit decimal with two digit decimal places
D) Date, consists of month/day/year
P) Phone, consists of area code plus seven-digit phone number
T) Time, consists of time of day in hours/minutes

The definition of data fields and the actual entry of data are easily mastered if you are familiar with the basic concepts. The real challenge to using a program of this type is to lay out the data fields in such a manner that the data can be easily obtained and used. I have maintained a list of software/hardware/games reviews pertaining to CoCo which have appeared in various publications. The list is getting quite long and hard to manage. Thus, I decided to see if I could get *Homebase* to handle this mass for me. It required about 30 minutes to decide just what fields I wanted to include. The creation of the data file required another 10 minutes. I was able to enter the data at a pretty good clip due to the excellent screens used during this process. Once the data was in, I started processing it according to hardware, software, type of software review, and the magazine it was in. I was surprised at the ease with which I could extract the desired information from database. There is one hooker in the entire process. The "select" function is the command which does the formatting and requires a good deal of experimentation to discover its secrets. But once mastered, everything will fall into place. All the necessary functions are available to completely manage the database, such as adding, deleting, updating, searching and clearing fields and records. Also there is a calculate command which allows adding, subtracting, multiplying and dividing any of the data fields. Also included is a set of utilities which provide all the required support functions.

I found *Homebase* easy to use once I got into it and was pleased with the results. Though it is not a full blown data base manager, it most certainly has its applications and is not nearly as costly as its big brothers. I have one suggestion. I found the field descriptors to be too limited and narrow. The addition of a variable length character field would be a definite asset. That, coupled with the three decimal fields, would make *Homebase* a much more versatile package.

I consider *Homebase* to be a program of good quality and design. It is apparent from the documentation and the flow of the programs themselves that a considerable amount of thought went into their design. The menus are very well designed and are laid out in a most appealing manner. As a database program I like *Homebase*. I think its applications are limited only by its user. It can be tailored to fit your requirements within the previously mentioned constraints. For example, it can be used to handle small mailing lists, club rosters, phone lists or your checking account. The point is the program is very versatile and has many good applications. Another strong point is its ability to increase the size of its output file to the maximum, or update existing records without the familiar disk thrashing caused by the expansion of sequential files. The text processing section will indeed provide the user with the ability to produce good documents. However, I found it a little hard to use, but then maybe I'm spoiled by word processors. If you want a text processor capable of generating files for a macro assembler or a basic compiler, *Homebase* will do it for you with ease. If you are looking for a data manager first, then *Homebase* may well be the answer and the text processor becomes an added feature. If you are looking for just a text/word processor only, then I would not recommend *Homebase*. Included with the documentation is a phone number you can call if you have trouble with *Homebase* to receive assistance.

(Homebase Computer Systems, P.O. Box 3448, Durham, N.C., 27702, $75.00 plus $5.00 postage and handling)

Corrections

In Jorge Mir's article, "The Latest Program? Here's A Dating System" (page 58, February 1983 issue), lines one through four of the listing are missing. Of these, three are REM statements, but line 3 is critical:

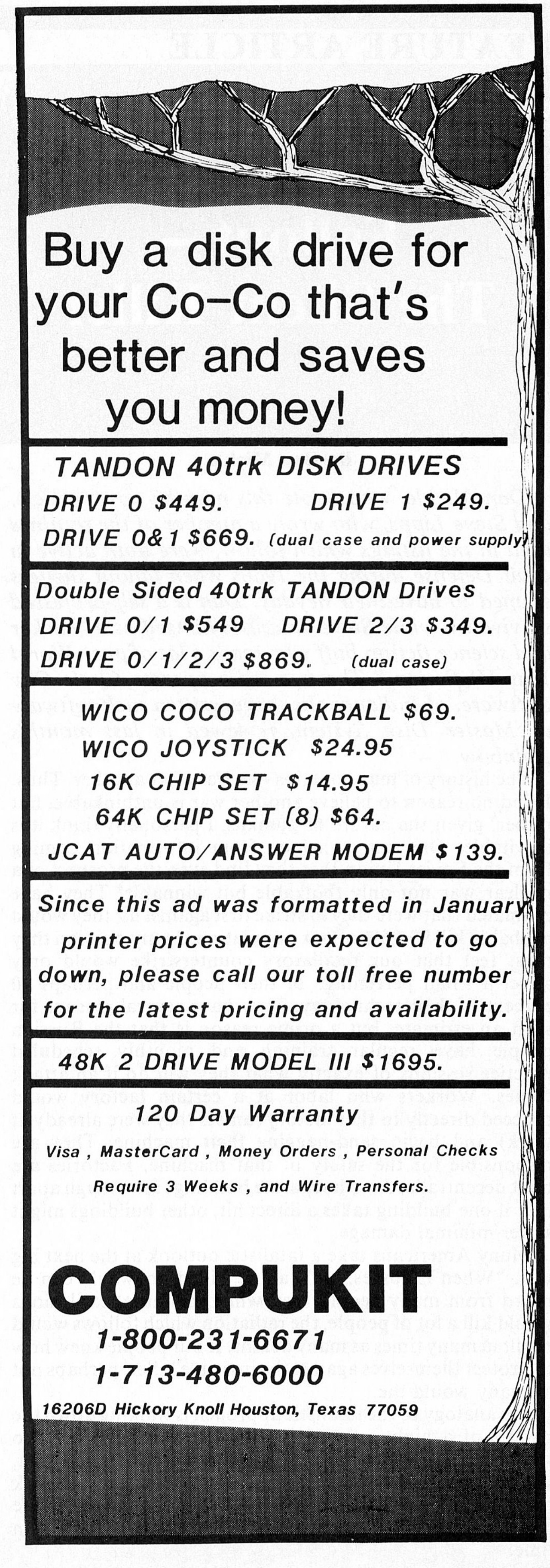
```
1 '  *** AUTOMATIC DATING ***
2 '      BY:  JORGE MIR
3      DATE$="10/21/82"
4 '
```

In his article, "Techniques For Plotting Screen Graphics" (page 186, February issue), *Rainbow* contributing editor Don Inman "neglected to include the line which draws the line." To correct Plotter Program #1, readers should insert:

```
1015 LINE (X1,Y1)-(X2,Y2),PSET
```

Also, in the options for program #2 (bottom of righthand column, page 191, *Rainbow* failed to add the "less than" and "greater than" symbols. The lines should read:

```
125 IF N<3 THEN PRINT "I NEED AT
 LEAST 3 LINES": GOTO 120
153 IF X(Z)>255 OR X(Z)<0 THEN P
RINT "INPUT OUT OF BOUNDS-TRY AG
AIN":GOTO 150
156 IF Y(Z)>181 OR Y(Z)<0 THEN P
RINT "INPUT OUT OF BOUNDS-TRY AG
AIN":GOTO 150
```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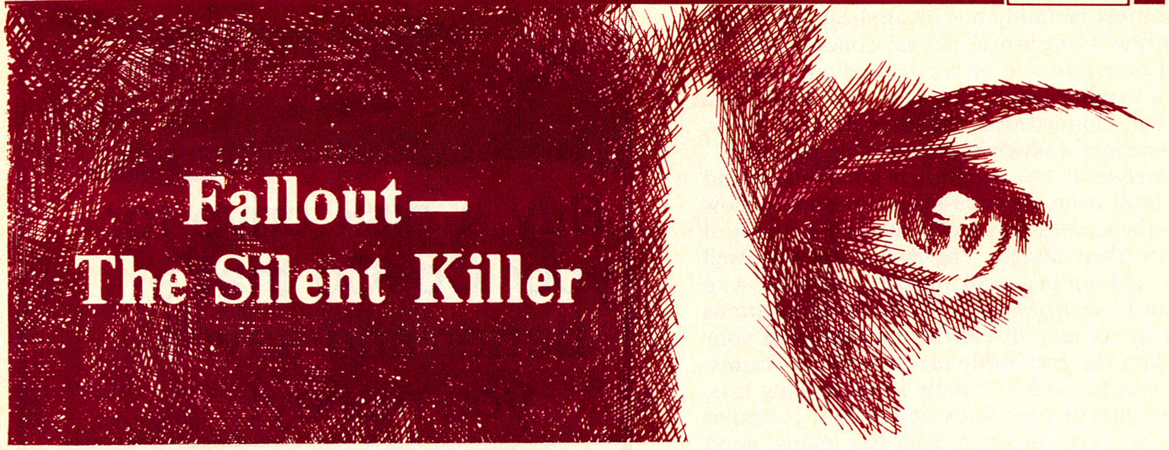


Fallout—
The Silent Killer

By Dan Mickle

Dan Mickle, who wrote this month's cover article, and Steve Lipps, who wrote a number of the routines used in the listings which follow, were both active in Civil Defense during the 1960s when fallout shelters seemed to have their heyday. Dan is a self-professed survivalist, while Steve describes himself as a "hacker and science fiction buff who reads a lot of post-World War III fiction." The two, who operate Circle City Software, of Indianapolis, have written such software as Master Disk System, reviewed in last month's Rainbow.

The history of man contains one war after another. Thus, I find no reason to believe another war is unthinkable, but rather, given the nature of humans, I personally think it is inevitable. One can conclude from information coming from the Soviet Union that they find even the prospect of a nuclear war not only thinkable but winnable! They have estimated that were they to strike first against us, they would probably kill 90-95% of our population. In my opinion they must feel that our retaliatory counterstrike would only affect a small percentage of their people and perhaps 10 percent of their technology. They have several reasons for such an estimate, but a prime reason is that the Russian people have regular training and monthly scheduled practice sessions of exactly what they will do if an attack comes. Workers who labor at a certain factory would proceed directly to that factory (unless they were already at work) and begin sand-bagging their machine. They are responsible for the safety of that machine. Factories are built decentralized, with separate buildings far enough apart that if one building takes a direct hit, other buildings might suffer minimal damage.

Many Americans take a fatalistic outlook at the next big war. "When it comes, we'll all be killed anyway!" can be heard from many people. Yet, while the initial explosions would kill a lot of people, the radiation which follows would result in many times as many deaths. If our people knew how to protect themselves against the invisible killer, perhaps not as many would die.

My analogy to the fatalistic approach is walking down the middle of a highway, and stating that you don't need to watch out for traffic, because when a large truck hits you, you will be dead anyway ... ridiculous! Obviously a truck need not hit you if you know enough to get to the side of the road and to watch out for trucks and jump out of the way in time.

Fallout radiation need not kill you if you know to "jump out of the way" (seek shelter) *in time*. The *Fallout* program and this article do not constitute a complete training course on how to live through war, but I hope this information will help a few more survive, should war come. The information is as factual as I can make it, and is based on material from the U.S. Government Printing Office at Washington, D.C. should you wish further information. The first listing is the heart of the fallout prediction program, and will run on any 16K extended or disk-extended system. If you have a printer, the program gives you the option of using that printer for your output device. NOTE: Since this is a "high priority" program, the printer utilities patch themselves in and overwrite any other routines you may have residing in high memory. The second part of the program may be *MERGEd* in, if you have 32K of memory. It is not an essential part of the program. It is only a high-res drawing of the "cigar shape" of a fallout pattern as a reminder. For those who do not have the time to punch in the program from this listing, the *Fallout* program is available through *Rainbow On Tape*.

If our country were attacked, the enemy would be trying to destroy the United States as a world power. This means that their primary targets would be our military bases, and our nation's capitol. However, many military bases exist near large cities, so those would suffer the same as the primary targets. The larger cities are targeted anyway, due to factories and plants which can be easily converted to wartime equipment production, or natural port areas for staging counterstrikes. Claiming the inaccuracy of enemy targeting computers and rocket control interfaces, it is estimated by some that their bombs may strike many miles from the intended target, through over/undershot. Important targets will get more than one bomb, but even then the unknown element of warhead "fratricide" (a theory stating that the first explosion might destroy the electronics of others in the same area) may spare millions.

YOU ARE ALIVE. The wave of missiles has gone off, and you survived the searing heat of the fireball. What's next? *Shock-wave!* The shock travels at the speed of sound outward from the blast, just as thunder follows lightning. It will hit like an extremely powerful earthquake causing buildings within several miles of the blast to be leveled, and lesser damage like shattered windows twenty or more miles out. The initial blast also spreads radiation outward a distance equal to the crosswind value. You will see that if you have a wind speed of zero, the upwind and crosswind values are the same and the fallout would eventually settle in a circle no greater than the maximum width value. In reality, terrain and other features in your area will affect how large a dose you can expect. A hill sitting between you and the blast will act as a natural barrier which could save your life.

For the sake of an example, let us imagine that a nuclear bomb has just gone off 25 miles away to the north. You were asleep in your bedroom. Your curtains could have just caught fire, but you were not directly in line with the heat from the fireball. You have a choice which depends a lot upon your exact situation at the time. Pull the blankets and covers completely over you head, then you may: 1) stay where you are, 2) crawl to a closet, closing the door, 3) crawl under the bed (not likely for most adults), 4) keeping the covers over you, push up the mattress and crawl under it (not likely for children), 5) if a cellar door is near your bed, crawl there. Roughly calculating the shockwave at five seconds per mile, you figure you have two minutes before the shockwave hits, and things fall in on you. This is the main reason to crawl quickly to the closest place of relative safety. The bathtub, perhaps? If you were outside in the open, a culvert or even a ditch or shallow depression might protect you from the blast. The fireball would probably still be going on when the shocks hit. A ground shock would come first, followed by the air-shock, because a shockwave travels faster through solid objects (the Earth).

Since there would be no electricity to power your Color Computer, you should commit the tables to memory, or at least to paper. You know that the normal wind in your area blows east, going back to the example, and that you are south of the blast. You will be able to guesstimate a 10 megaton blast based on the severity of the blast at this distance (severe, but you made it) and you will know that you are probably now getting in the neighborhood of 50 roentgens per hour. A dosage of 450 roentgens will kill 50 percent of the people exposed to that much. Since radiation is cumulative, you will reach that level in nine hours of exposure, and it will be a slow painful death. However, according to goverment figures, every three inches of earth you can put between you and the radiation will cut the level in half. Let us say your house is still relatively intact. If you are going to rush going outside to shovel dirt over cellar windows, or up around the foundation, do it now. Grab a rubber raincoat or other easily brushed-off article of clothing. If you don't have a hood, you might tie a plastic trashbag over your head to keep the dust from settling directly on you. Tie a scarf of towel over your mouth. *SPEED IS ESSENTIAL.* You may not be able to draw any water if the pipes were damaged, so you can't wet the rag, but you may have stocked the cellar with a few plastic jugs of drinking water. Stay outside for *as short a time as possible*, but try to seal up any major cracks which will let the dust in directly. Inside the house, drag mattresses and furniture over the spot you will be staying or around a closet, etc. Get into your shelter, breathe through clean towels or clothing, and stay there as long as possible. Remember that the wind could have shifted, putting you into the heart of the hot (3000+ roentgen) zone in which *10 to 12 minutes* of exposure can be enough to kill you. Since the fallout is carried by the air (wind) after the initial blast, the radiation level which started at about 50 in this example, could be 100 within a half hour, 300 within an hour, 1000 within an hour and a half, and 3000 in two hours.

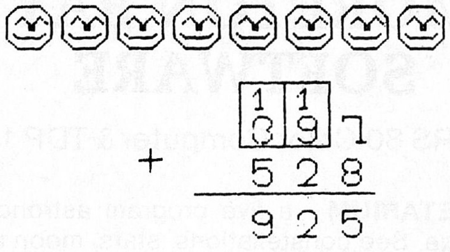
You can see that what you do in the first few minutes might save your life. Even if you are directly in the path of the hottest radiation zone, it could take a couple hours or more to build up to that level. The radiation level drops off rapidly with time. The 3000 roentgen level will only last seven to eight hours after the blast for a 10 megaton size or 24 hours for a 50 megaton bomb. For a 10 megaton blast the radiation will have dropped below 100 again in about 36 hours, but for the largest bombs this will take five days. If you were that close to a 50 megaton blast (25 miles) you would likely be dead from burns, or at least blinded. A 50 megaton blast can cause flash burns and blindness to 50 miles away. Several smaller bombs saturating an area could give the same effect.

You should try to stay in your shelter for two weeks at least but three would be better. If you must come out for any reason, wait as long as you can before going out, bundle up as though going into a blizzard, stay out not one second longer than you have to. Remove the outside clothes and leave them near the door (as far as you can away from you). Don't forget boots and covering your mouth.

Those victims of the initial blast still living may have broken bones, burns, or blindness. Splint broken bones using a stick, leg of a chair, etc., and tape or rags, getting them as straight as possible. Burns should be rinsed if water is available, then treat as any normal burn, giving aspirins or any other available medicines to cut the pain. If a victim has been blinded, especially if there are no serious burns around the eyes, keep the eyes covered for several days, checking occasionally whether sight has returned. Such blindness could be temporary if the person is given time to recuperate.

Victims of radiation will experience varying degrees of nausea, vomiting, diarrhea, cramps, and even coughing up blood. Radiation first attacks the body's immune system, so germs that already exist in your body can make you very

"CARRY"



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sick. Make the patient as comfortable as circumstances permit.

The first listing which follows is the heart of the fallout prediction program, and will run on any 16K ECB or disk-extended system. If you have a printer the program gives you the option of using that printer for your output device. NOTE: Since this is a high-priority program the printer utilities patch themselves in and overwrite any other routines you may have residing in high memory. The second listing is not an essential part of the program. It is only a high-res drawing of the "cigar-shape" of a fallout pattern as a reminder. For those who do not have the time to punch in the program from this listing, I understand the *Fallout* program will be available through *Rainbow On Tape.*

(Mr. Mickle is one the the owners of Circle City Software and has been interested in the question of nuclear war for some years.)

100	02C0
200	0579
248	0CF8
500	0EED
700	131D
800	17A9
1000	19CE
END	1CB9

Listing 1:

```
10 CLS:GOTO 1750
20 CLEAR250:IF PEEK(65314) AND1
THEND=0 ELSED=-2:GOTO810
30 CLS3:IFPEEK(65314) AND1 THEND
9=0:GOSUB1110:POKE65314,13:ELSEI
NPUT" I SEE A PRINTER ATTACHED,
DO  YOU WANT OUTPUT TO PRINTER"
;A$:IFLEFT$(A$,1)="Y"THEND9=-2:E
LSED9=0
40 PRINT#D9," THIS PROGRAM IS SI
MPLY AN AID  TO HELP YOU KNOW WH
AT TO DO IN  CASE OF NUCLEAR ATT
ACK.
50 PRINT#D9:PRINT#D9,"THERE ARE
TWO SECTIONS.
60 PRINT#D9,"  (1) TABLES WHICH
HELP YOU TO  PLOT WHERE THE RADI
ATION WILL   FALL.
70 PRINT#D9,"  (2) EXPLAINATIONS
 OF HOW TO   PROTECT YOURSELF.
78 IFD9=-2THENCLS
80 PRINT#D9:PRINT#D9,"DO YOU WAN
T WIND/FALLOUT TABLES":INPUT"";W
$:PRINT#D9,CHR$(13):IFLEFT$(W$,1
)="N"THEN190
90 PRINT#D9," SINGLE PATTERN":IN
PUT"";Z$:PRINT#D9:IFLEFT$(Z$,1)=
"N"THENZ=0ELSEZ=1
100 PRINT#D9," SIZE BOMB IN MEGA
TONS (1,5,10,    OR 50)":INPUT"";
S$:PRINT#D9:S=VAL(S$)
110 IFS=1ORS=5ORS=10ORS=50THEN11
2ELSE100
112 CLS:PRINT@67,"ANY RADIO STAT
IONS STILL ABLETO BROADCAST WILL
 TRANSMIT BOTH VALUABLE SURVIVAL
 INFORMATION   AND INFO ABOUT HE
AVY RADIATION  IN YOUR AREA. IN
CASE YOU CANNOTPICK UP BROADCAST
S FOR YOUR AREAYOU SHOULD MAKE A
 GUESS AT WIND
113 PRINT"SPEED AND DIRECTION BA
SED ON THEWEATHER PATTERNS IN YO
UR LOCALE.
115 GOSUB510
120 IFZ=1THENPRINT#D9," WIND SPE
ED (MPH)":INPUT"";W$:PRINT#D9:W=
INT(VAL(W$)):IFW<0ORW>300THEN120
130 CLS:PRINT#D9:PRINT#D9,CHR$(1
2)"    WIND/FALLOUT PATTERN":PR
INT#D9,"          "S"MEGATON BOMB
140 PRINT#D9,STRING$(32,61);
150 IFZ=0THENFORW=10TO50STEP10
160 GOSUB530
170 GOSUB510
180 IFZ=0THENNEXT
190 PRINT#D9,"DO YOU WANT PROTEC
TION METHODS ":INPUT"";Z$:IFLEFT
$(Z$,1)="N"THEN1000
200 CLS:PRINT#D9,"PROTECT AGAINS
T RADIOACTIVE DUST";STRING$(32,6
1);
203 PRINT#D9,"    IF YOU ARE CAUG
HT OUTSIDE AT THE INSTANT OF THE
 EXPLOSION:   YOU MAY RECEIVE FL
ASH-BURNS AND TEMPORARY OR PERMA
```

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```
10 PRINT"EXAMPLE": FORX=ATO M:FORY=STO
P:Z=X+Y:PRINTZ:NEXTY:NEXTX
```

Into this: –

```
10 PRINT "EXAMPLE":
         FOR X = A TO M:
              FOR Y = S TO P:
                   Z = X + Y:
                   PRINT Z:
              NEXT Y:
         NEXT X
```

With one simple command.

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```
NENT BLINDNESS  CLOSE YOUR EYES
IMMEDIATELY ! THROW YOURSELF FAC
E-DOWN TO THE GROUND. PULL YOUR
HOOD OR SOME
204 PRINT#D9,"CLOTHING OVER YOUR
 HEAD,  FOLD  YOUR HANDS UNDER Y
OU. A CULVERT,DRAIN, EVEN A ";
205 PRINT#D9,"SMALL GROUND SWELL
COULD PROTECT YOU. THE INFERNO
OF THE FIREBALL WILL LAST FROM
ONE AND A HALF TO TWO MINUTES.
208 GOSUB510
209 PRINT#D9,"  A SEVERE DOUBLE
SHOCKWAVE WILLFOLLOW AT ABOUT 5
SECONDS PER   MILE OF DISTANCE F
ROM BLAST (AT FIFTY MILES THIS E
QUATES TO FOURMINUTES DELAY AFTE
R FLASH.)
210 PRINT#D9,"   THE DUST WILL D
ESCEND FROM  ABOVE, AND COLLECT
 ON THE GROUNDTO BE STIRRED UP A
S YOU WALK, ORBY PASSING MILITAR
Y OR CIVILIAN VEHICLES.
220 PRINT#D9,"   YOU SHOULD COVE
R YOUR MOUTH  WITH A HANDKERCHIE
F OR ANY CLEANCLOTH YOU CAN BREA
THE THROUGH.  THIS IS EVEN MORE
IMPORTANT THANCOVERING UP YOUR B
ODY, AS ANY":GOSUB510:PRINT#D9:P
RINT#D9,"RADIOACTIVE PARTICLES W
HICH GET INSIDE ";
230 PRINT#D9,"YOUR BODY CAN LAY
THERE
240 PRINT#D9," DOING DAMAGE FOR
SEVERAL DAYS,  OR EVEN WEEKS. YO
U SHOULD ALSO  COVER YOUR BODY A
S MUCH AS YOU  CAN, AND WASH UPO
N REENTERING   YOUR SHELTER. IF
WATER IS AT A  PREMIUM, AT LEAST
 BRUSH OFF...!";
243 PRINT#D9,"      IF YOU ARE WIT
HIN THE CROSS-WIND DISTANCE OF T
HE 10 ROENTGENPER HOUR ZONE, YOU
 ARE ALREADY  GETTING SOME RADIA
TION. YOU MUSTGET INSIDE AS FAST
 AS POSSIBLE. EVERY THREE FEET O
F AIR OR THREEINCHES OF DIRT BET
WEEN YOU AND
245 GOSUB510:PRINT#D9,"THE RADIA
TION CUTS THE LEVEL YOUARE GETTI
NG IN HALF, SO RUN TO  THE CELLA
R OR ANY CENTRAL ROOM  WITHOUT W
INDOWS, COVER UP WITH ANY CLOTHE
S, BLANKETS, ETC. AND
247 PRINT#D9,"WAIT. THE FIRST HO
UR OR MORE THELEVEL OF RADIATION
 INCREASES TO MAXIMUM, THEN BEGI
NS TO DROP OFF SLOWLY. EVEN IF Y
OU HAD NO TIMETO DRAW WATER, YOU
 CAN STAY HID FOR AT LEAST A DAY
, OR MORE.   DO NOT COME OUT I
N THE OPEN
248 PRINT#D9,"  UNTIL YOU ABSOLU
TELY HAVE TO!
250 GOSUB510:GOTO770
260 U=10:RETURN
270 V=8:U=8:RETURN
280 V=7:U=7:RETURN
290 V=6:U=6:RETURN
300 U=5:V=5:RETURN
310 U=32:RETURN
320 U=25:RETURN
330 U=22:RETURN
340 U=19:RETURN
350 U=16:RETURN
360 U=37:RETURN
370 U=34:RETURN
380 U=31:RETURN
390 U=28:RETURN
400 U=25:RETURN
410 U=104:RETURN
420 U=97:RETURN
430 U=91:RETURN
440 U=85:RETURN
450 U=80:RETURN
460 IFL=100THENU=INT(U*10+V):U=I
NT(U*10/21-9):V=U-INT(U/10*10):U
=U/10
```

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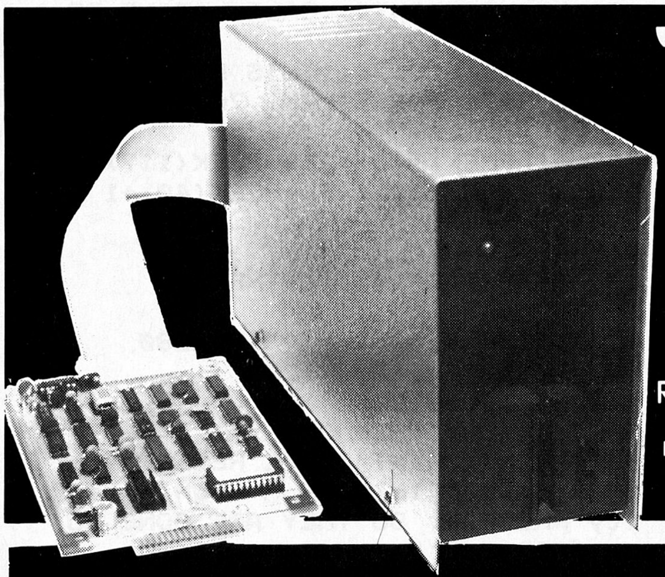
```
470 IFL=1000THENU=INT(U*10+V):U=
INT(U/11):V=U-INT(U/10*10):U=U/1
0
480 IFL=3000THENU=INT(U*10+V):U=
INT(U/21+1):V=U-INT(U/10*10):U=U
/10
490 IFS>5 ANDL=3000THENU=INT(U*1
0+V):U=INT(U/2):V=U-INT(U/10*10)
:U=U/10
500 RETURN
510 IFD9=0 THENPRINT@480,"     PRE
SS ANY KEY TO CONTINUE:";:ELSEPR
INT#D9,"PRESS ANY KEY TO CONTINU
E:"
520 IFINKEY$=""THEN520ELSECLS:RE
TURN
530 PRINT#D9:PRINT#D9," "W" M.P.
H. WIND
550 PRINT#D9,"LEVEL*UPWIND*CROSS
*DOWN*MAXWIDTH":PRINT#D9," R/HR
  MI.   MI.   MI.   MI.
560 L=10:GOSUB570:L=100:GOSUB570
:L=1000:GOSUB570:L=3000:GOSUB570
:RETURN
565 IFW<5THENW=5
570 B=0:D=INT(936*INT((W+5)/10))
:IFS=10THEND1=10:B=10:M=2420:ELS
EIFS=1THEND1=44:M=515:ELSEIFS=5T
HEND1=15:B=5:M=1512:ELSEIFS=50TH
END1=3:B=15:M=8066
580 D=D*10:D=INT(D/D1)
590 IFL=100THEND=INT(D/2.7):ELSE
IFL=1000THEND=INT(D/7.3):ELSEIFL
=3000THEND=INT(D/13)
600 IFW<5 ANDL=1GOSUB570
610 M=M/W:IFL=100THENM=M/1.9:ELS
EIFL=1000THENM=M/4.7:ELSEIFL=300
0THENM=M/11
615 IFB+INT(W/10)<1THENB=1
620 V=0:B=B+INT(W/10):ONB GOSUB2
60,270,280,290,300,310,320,330,3
40,350,360,370,380,390,400,410,4
20,430,440,450
630 GOSUB460:IFL=10THENC1=110:C2
=350:C3=400:C4=1250:ELSEIFL=100T
HENC1=47:C2=150:C3=180:C4=550:EL
SEIFL=1000THENC1=14:C2=46:C3=60:
C4=175:ELSEIFL=3000THENC1=4:C2=1
5:C3=16:C4=50
640 IFS><1THEN660
650 C=-110*(L=10)-47*(L=100)-14*
(L=1000)-4*(L=3000)
660 IFS><10THEN680
670 C=-400*(L=10)-180*(L=100)-60
*(L=1000)-16*(L=3000)
680 IFS><5THEN700
690 C=-350*(L=10)-150*(L=100)-46
*(L=1000)-15*(L=3000)
700 IFS><50THEN720
710 C=-1250*(L=10)-550*(L=100)-1
```



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```
75*(L=1000)-50*(L=3000)
720 C=C/10
730 IFM=0THENM=1
740 IFW<5THENU=C:V=E
745 IFU>C THENC1=U:U=C:C=C1
750 PRINT#D9,USING" ####";L;:PRI
NT#D9,USING" ###.#";U;:PRINT#D9,
USING" ###.#";C;:PRINT#D9,USING"
 #####";D;:IFM>=10THENPRINT#D9,U
SING"  ####";M:ELSEPRINT#D9,USIN
G"     ##.#";M
760 RETURN
770 PRINT#D9,"IF YOU HAVE PRIOR
WARNING THAT  A NUCLEAR EXPLOSIO
N IS IMMINENT,  DRAW WATER",,"
IF YOU HAVE A CELLAR, GO OUT  AN
D SHOVEL DIRT, GRAVEL, ETC.   AR
OUND THE FOUNDATION AND BACK- FI
LL OVER WINDOWS. DRAG BOARDS, MA
TTRESSES, OR ANYTHING TO
780 PRINT#D9,"FLOOR OVER YOUR SH
ELTER AREA, TOCUT DOWN RADIATION
.","  IF YOU ARE GOING TO WAIT I
N A CLOSET, PICK ONE NEAR THE CE
NTEROF THE HOUSE, PULL MATTRESSE
S OROTHER HEAVY FURNITURE AROUND
 IT.":GOSUB510:PRINT#D9,"LAYING
IN A BATHTUB WITH A TABLE
785 PRINT#D9,"OR HEAVY MATTRESS
OVER IT MIGHT PROTECT YOU IF THE
 HOUSE SHOULD COLLAPSE DURING TH
E SHOCK-WAVE."
787 PRINT#D9,"BUT IS NOT SUFFICI
ENT AGAINST  THE RADIATION (FAL
LOUT). AFTER  THE SHOCK-WAVE, IF
 YOUR HOUSE ISDESTROYED, RUN TO
A NEIGHBOR'S, OR ANY PUBLIC FALL
OUT SHELTER IFLESS THAN A MINUTE
 OR TWO AWAY..  BUT GET AS FAR
FROM THE DUST
788 PRINT#D9,"FALLING OUT OF THE
 SKY AS YOU     CAN.",,"   GOOD
LUCK !":GOSUB510
790 GOTO1000
800 END
810 CLS:PRINT"
820 PRINT:PRINT"  CALCULATING PR
OGRAM LOCATION
830 'POKE150,174:'THIS POKE SETS
 BAUD RATE FOR SILENT 700 PRINTE
R
840 X1=PEEK(116)*256+PEEK(117)+1
850 X2=PEEK(39)*256+PEEK(40)+1
860 X3=X1-X2
865 RESTORE
870 READA$:IFA$><"^"THEN870
880 READA$
890 IFLEFT$(A$,1)="^"THEN880
900 IFA$="END"THEN920
910 X=X+1:GOTO880
920 IF X3=0 THEN 950
930 PRINT:PRINT"I SEE RESERVED M
EMORY...BUT THIS IS A high prior
ity PROGRAM, SO THEY ARE GONE NO
W, SORRY...!"
940 PRINT:FORM=1TO15:PLAY"L255O4
CDEFGABO5BAGFEDC":NEXT
950 X2=X1-X:CLEAR 200,X2
960 POKE&H167,57
970 RESTORE:X=PEEK(39)*256+PEEK(
40)+1
980 PRINT"    ONE  MOMENT, PLEASE
...!
990 GOTO1560
1000 RUN
1110 RETURN
1540 '
1550 '
1560 READA$
1570 IF LEFT$(A$,1)<>"^" THEN159
0
1580 MR(Y)=X:Y=Y+1:GOTO1560
1590 IFA$="END"THEN1610
1600 POKEX,VAL(A$):X=X+1:GOTO156
0
1610 DATA ^,52,22,214,111,193,25
4,38,2,141,5,53,22,126,130,115
1620 DATA 129,13,38,27,124,3,249
,246,3,249,241,3,252,37,12,246,3
,251
1630 DATA 189,162,133,90,38,250,
127,3,249,127,3,250,57
1640 DATA 129,12,38,20,125,3,249
,39,14,134,13,189,162,133,141,21
3,125,3,249,38,246,134,12,57
1650 DATA 124,3,250,246,3,250,24
1,3,253,37,36,129,48,37,7,192,10
,241,3,253,37,25,134,13,141,22,1
41,177,246,3,255,247,3,250,39,8,
134,32,189,162,133,90,38,250,18,
18,57,57,126,162,133,END
1660 POKE&H168,INT(MR(0)/256):PO
KE(&H169),MR(0) AND 255
1690 POKE&H3FB,8:POKE&H3FC,25:PO
KE&H3F9,0:POKE&H3FA,0
```

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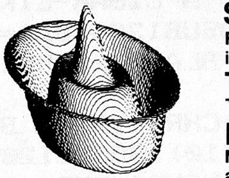

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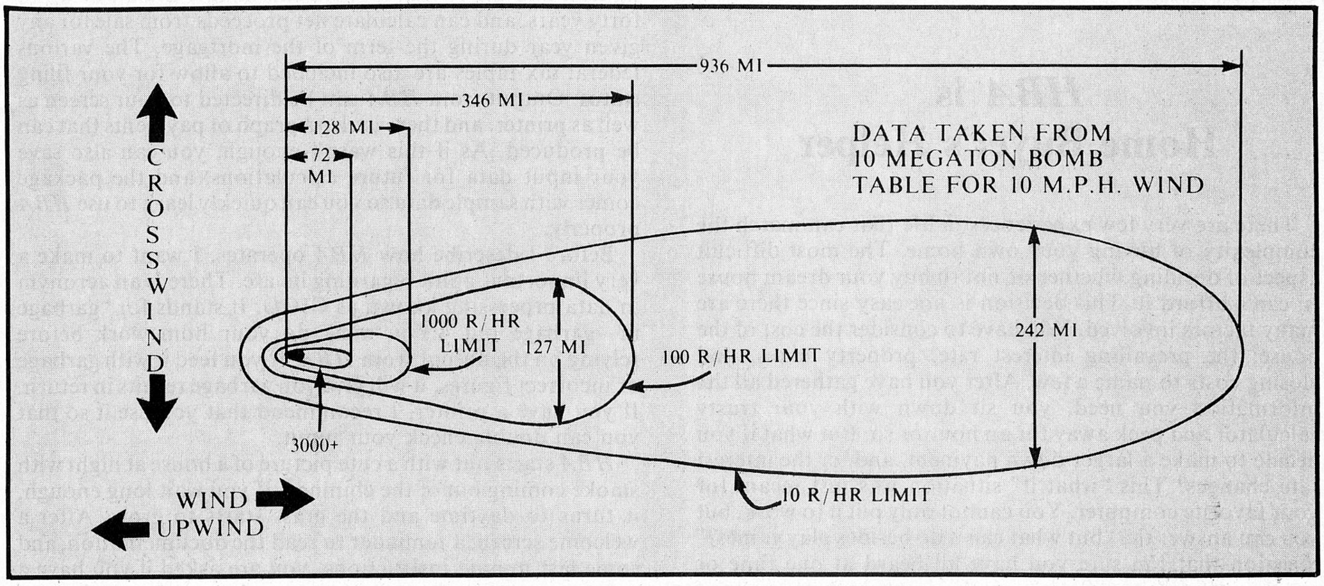
```
1700 POKE&H3FF,0
1710 POKE&H3FD,32
1720 POKE&H167,&H7E
1730 DATA 141,3,126,142,144
1731 '^
1740 D=2:CLS:GOTO30
1750 PMODE0:PCLEAR2:GOTO 20
```

1100	0216
1300	03A9
1400	0662
END	093E

Listing 2:

```
1000 PCLS:CLEAR100:GOSUB1110:GOT
O 1800
1010 CIRCLE(159,91),100,3,.4,.75
,.25
1020 CIRCLE(255,91),254,3,.17,.3
2,.695
1030 LINE(17,91)-(24,91),PSET:LI
NE(20,88)-(20,94),PSET
1040 PRESET(1,91):PRESET(1,90):P
RESET(1,89):PRESET(1,92)
1050 PSET(2,90,3):PSET(2,89,3):P
SET(2,91,3):PSET(2,92,3)
1060 LINE(120,88)-(180,88),PSET:
LINE(180,88)-(165,73),PSET:LINE(
180,88)-(165,103),PSET
1070 DRAWHM$:DRAW"S4":BB$="THE F
ALLOUT PATTERN WILL"+CHR$(10):GO
SUB1200
1080 BB$="OCCUR AS A CIGAR-LIKE
SHAPE"+CHR$(10):GOSUB1200:BB$="D
OWN-WIND FROM THE BLAST"+CHR$(10
):GOSUB1200
1090 BB$=CHR$(10)+CHR$(10)+" BLA
ST"+CHR$(10)+CHR$(10):GOSUB1200:
DRAW"S8":BB$="      WIND"+CHR$(10)
:GOSUB1200
1100 FORL=1TO2000:NEXT:RUN
1110 DIMAZ$(60)
1120 FORLE=0TO60
1130 READAZ$(LE):NEXTLE
1140 NC$="BR3BU7"
1150 NL$="BD4"
1160 BS$="BL9"
1170 HM$="BM0,10"
1180 CC=1
1190 RETURN
1200 CC=1:FORTT=1TOLEN(BB$)
1210 A9$=MID$(BB$,TT,1)
1220 IFA9$=CHR$(94)THENDRAWHM$:G
OTO1320
1230 IFA9$=" "THENDRAW"BR9":GOTO
1320
1240 IFA9$=CHR$(8) THENDRAWBS$:G
OTO1320
1250 IFA9$=CHR$(10)THENDRAW"BD12
BL250":GOTO1320
```



```
1260 IFA9$=CHR$(12) THENPCLS:GOT
O1320
1270 IF" ">A9$ OR"Z"<A9$ THEN132
0
1280 CC=CC+1
1290 IFCC>27 THENDRAWNL$:FORI=1T
O27:DRAWBS$:NEXTI:CC=1:GOTO1310
1300 DRAWNC$
1310 DRAWAZ$(AŞC(A9$)-30)
1315 DRAW"BR1
1320 NEXT
1330 RETURN
1340 GOTO1340
1350 DATA' !"#$%&'()*+,-./
1360 DATA BD7BR5,NR1D4R1NU4BD2ND
1L1D1R1,ND1R1D1NL1D1G1BR3E1U2L1D
1R1BD6,BD1R1NU1ND4R3NU1NR1D3NL4N
R1D1BD2,BD1BR2NU1NR2L1G1F1R2F1G1
L1NL2D1BR2BD1,R1D1L1NU1BR5G5BR5L
1D1R1NU1,BR1BD1ND1E1R1F1D1G1L1NH
1G1D2F1R1E1U2NH1NE1F1BD2,ND1R1D1
NL1D1G1BD4BR1,BR1G1D5F1
1370 DATA F1D5G1BR1,BR3D3NL3ND3N
E2NF2NG2NH2R3BD4,BD3R3NU3ND3R3BD
4,BD4ND1R1D1NL1D1G1BR1,BD4R4BD3,
BD7U1R1D1NL1,BR5BD1G5BR5BD1
1380 '0-8
1390 DATABD1BR1D5F1R1E1U5H1L1G1B
D6BR5,BD1E1D7L1R2BR1,BD1E1R3F1D2
G1L3G1D2R5,BD1E1R3F1D1G1NL2F1D2G
1L3H1BF1BR4,BD4NR5E4D7BR1,NR5D3R
4F1D2G1L3H1BF1BR4,BD1BR5H1L3G1D5
F1R3E1U2H1L3G1BF3BR2,ND1R5D1G5D1
BR5,BD1E1R3F1D1G1NL3F1D2G1L3H1U2
E1H1NU1BF5
1400 '9:;<=>?@
1410 DATA BD6F1R3E1U5H1L3G1D2F1R
3E1BD4,BD1R1D1L1U1BD3R1D1L1U1BD3
BR2,BD1R1D1L1U1BD3NR1D1R1NU1D1G1
BR2,BD1BR3G3F3,BD3NR4BD2R4BD2,BD
1F3G3BR3,BD1E1R2F1D1G2BD2ND1L1D1
R1BR3,BD2BR1ND2E1R1F1D2G1L1H1BR3
D1R1U4H1L3G1D5F1R4
1420 ' A-H
1430 DATA BD7U3NR5U3E1R3F1D6,ND7
R4F1D1G1NL4F1D2G1NL4BR1,BD1D5F1R
3E1U1BU3U1H1L3G1BD6BR5,D7R4E1U5H
1L4BD7BR5,NR5D3NR4D4R5,NR5D3NR4D
4BR5,BD1D5F1R3E1U2NL2BU2U1H1L3G1
BD6BR5,D7U4R5NU3D4
1440 ' I-T
1450 DATA R4L2D7L2R4BR1,BD5D1F1R
3E1U6BD7,D7U4R3E2NU1G2F2D2,D7R5,
ND7F3E3D7BR1,ND7F5NU5D2,BD1D5F1R
3E1U5H1L3G1BD6BR5,ND7R4F1D2G1L4B
D3BR5,BD1D5F1R3E1U5H1L3G1D4BR3F2
,ND7R4F1D1G1NL4F1D3,BD1D1F1R3F1D
2G1L3H1BU5E1R3F1BD6,R4L2D7BR2
1460 ' U-Z
1470 DATA D6F1R3E1U6BD7,D4F3E3NU
4BD3BR1,D7E3F3U7BD7BR1,D1F5D1BL5
U1E5U1BD7,D2F2ND3E2U2BD7BR1,R5D1
G5D1R5
1800 PMODE3:SCREEN4:GOTO1010
```

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Software Review...

HBA is
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There are very few experiences in life that can match the complexity of buying your own home. The most difficult aspect of deciding whether or not to buy your dream house is, can I afford it. This decision is not easy since there are many factors involved. You have to consider the cost of the house, the prevailing interest rate, property taxes, and closing costs to name a few. After you have gathered all the information you need, you sit down with your trusty calculator and peck away for an hour or so. But what if you decide to make a larger down payment, and/or the interest rate changes? This "what if" situation was just meant for your favorite computer. You cannot only put it to work, but you can answer the "but what can it do besides play games?" question that I'm sure you have all heard at one time or another. If you are still with me, this is where the purpose of this review comes in.

The *Home Buyer's Analyzer*, which I shall refer to as *HBA* from now on, is a set of programs that will enable you to easily figure out exactly what it will cost you to buy a home. But this is only the beginning. Its many features include calculations of monthly payment, effective monthly payment after tax considerations, effects of appreciation in the value of the home, federal tax benefits, year of sale figures, and many more. *HBA* can handle a loan of up to forty years, and can calculate net proceeds from sale for any given year during the term of the mortgage. The various federal tax tables are also included to allow for your filing status. Output from *HBA* can be directed to your screen as well as printer, and there is also a graph of payments that can be produced. As if this wasn't enough, you can also save your input data for future calculations, and the package comes with sample data so you can quickly learn to use *HBA* properly.

Before I describe how *HBA* operates, I want to make a very important point regarding its use. There is an acronym in data processing known as GIGO. It stands for "garbage in—garbage out." You must do your homework before relying on the output from *HBA*. If you feed it with garbage or incorrect figures, it will give you garbage results in return. If you have a printer, I recommend that you use it so that you can double check your input.

HBA starts out with a cute picture of a house at night with smoke coming out of the chimney. If you wait long enough, it turns to daytime and the grass starts to grow. After a welcome screen, a reminder to read the documentation, and some last minute instructions, you are asked if you have a printer. At this point *HBA* gets down to business. You are then asked about your federal income tax filing status, intended year of purchase, and your state and/or local tax bite. You are then presented with a review screen with the opportunity to make changes in case you goofed up. *HBA* is now getting ready to ask you a whole slew of questions. It is here that your previously saved figures can be recalled if you want. Some of the things you are asked at this point are purchase price, down payment, interest rate, term of mortgage, and annual income. As before you are given a review screen before proceeding. By the way *HBA* also handles balloon (variable rate) mortgages.

So far *HBA* has been a one-way street. Nothing but questions, questions, questions. How about some output? Here is where *HBA* really shines, but first some more quesions. What kind of output do you want? You can get a particular year displayed, all years plus year of sale, or year of sale only. Some of the output figures are monthly payment (with and without property taxes included), mortgage balance, interest paid, and your federal income tax with and without your tax benefits from interest and property tax deductions. After reviewing your output you are asked (what, more questions!) if you would like a graph produced showing your total payment, effective (after tax) payment, and effective payment after property appreciation. This was the only feature of *HBA* I thought could use some improvement. The three lines plotted on the graph were usually too close together due to the scale chosen. As far as I'm concerned this is a very minor problem, and in fact the graph feature is really just a frill and in no way affects the real value of *HBA*. Last but not least, your final two questions. Do you want to save your input figures and do you want another go at it.

Computers are very good at number crunching and *HBA* will push your CoCo to its limits. The documentation included is complete and will hold your hand all the way through. Most importantly, there are definitions given for all of the input and output fields. No assumption is made that you understand all the buzz words involved in such a complex scenario. If you are in the market for a home, consider *HBA* before you buy.

(Home Buyer's Analyzer, Silver Spring Software, 18 Silver Spring Road, West Orange, NJ 07052, $39.95 disk, $34.95 tape)

—Gerry Schechter

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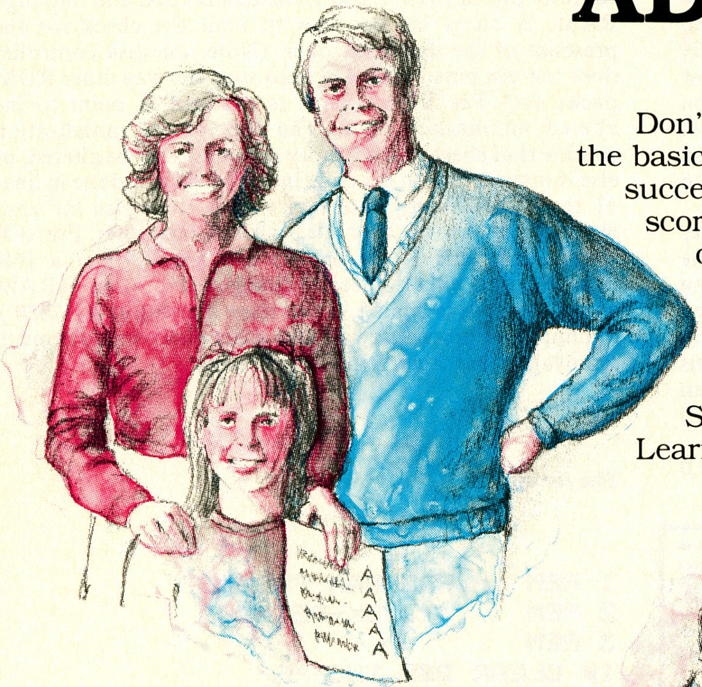

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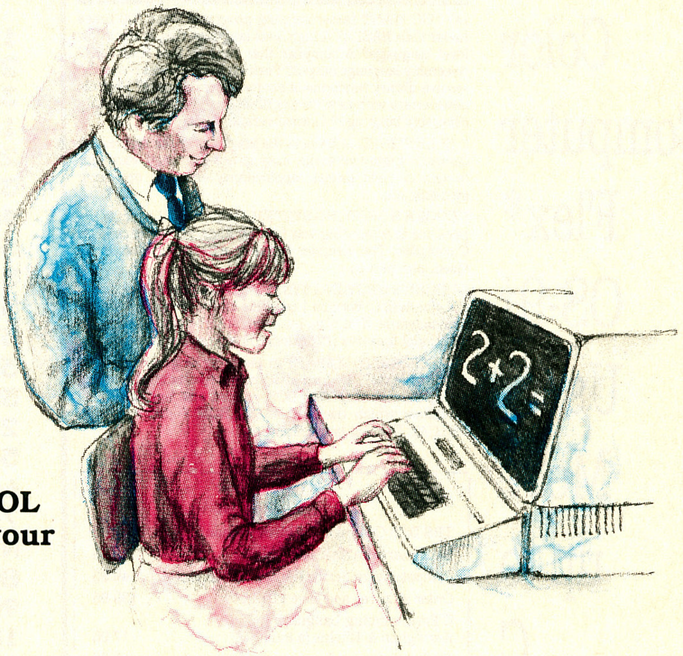

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DOS 'Detach' Saves Wear and Tear

By Herbert Schroeder

The attached listing should be of interest to Color Computer owners with disk drives. The program allows you to "detach" the disk operating system (i.e. return control to non-disk Extended BASIC) without having to physically unplug the disk controller. The advantage of this is that now you can run machine language programs that won't work on the Radio Shack disk system without the hassle of unplugging the disk ROM Pack. This saves wear and tear on the connectors, reducing the chances of I/O errors due to bad connections.

The program can be loaded from tape or disk. After running, it will tell you to press reset. When you do this, the computer does a cold start from Extended BASIC, ignoring the function exactly as if the disk drive were unplugged, even though the controller is in fact still in the ROM port. You can even use the high-speed poke. I can't guarantee that this procedure is fool-proof, but so far it has enabled me to run every "non-disk" program (machine language and BASIC) that I own without unplugging the drive.

To reattach the disk operating system, type *POKE* 113,0 and press Reset. This does a cold start to disk Basic.

The program works by copying the RAM initialization routines out of BASIC and Extended BASIC and into high RAM. It alters the routines to omit the check for the presence of the disk controller. (Note: the disk controller does not use pins 7 and 8 to auto start the way other ROM packs do.) The Reset vector is changed to point to the altered intialization code. The part of the initialization routine that checks for memory size must also be altered, or else it interferes with the code in RAM. This is done in lines 51 to 53, by directly inserting the memory size for your machine. **As printed here it is for a 32K computer. For 16K** change the "&H7F" in line 52 to "&H3F." For a 16K machine, you will also need to change the location in RAM where the code is copied. (I put mine starting at &H7000.)

I hope this procedure will save other disk owners as much annoyance and frustration as it has me.

The listing:

```
1 REM     PROGRAM "DSKDET"
2 REM      (DISK-DETACH)
3 REM
10 CLEAR 200,&H6FFF
20 POKE &H7000,&H12
30 FOR N=1 TO 16
40 POKE &H7000+N,PEEK(&HA073+N)
50 NEXT N
51 POKE &H7000+17,&H8E
52 POKE &H7000+18,&H7F
53 POKE &H7000+19,&HFE
54 FOR N=20 TO 78
55 POKE &H7000+N,PEEK(&HA073+N+1
2)
56 NEXT N
60 FOR N=1 TO 167
70 POKE &H7000+78+N,PEEK(&H8001+
N)
80 NEXT N
90 POKE &H7000+246,&H7E
100 POKE &H7000+247,&H80
110 POKE &H7000+248,&HB0
120 POKE &H72,&H70
130 POKE &H73,&H00
140 PRINT "PRESS RESET TO DETACH
DISK"
```

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RAINBOW CERTIFICATION SEAL

Power (of Attorney) At Your Fingertips

By Glenn B. Knight

I am happiest when I can send a check to some young computer wizard and get a program that will do something I want my computer to do for me. Eventually the world will awaken and recognize what we color computer pioneers have been telling them (that we are an insatiable market), and we will have all of the software that we need. That day is not yet today—so every now and then we have to write a program to meet our particular needs.

This little gem was zapped out (if you can call two weeks' work zapping out) when I was forced to fork over thirty-five hard-earned bucks to a lawyer for a Power of Attorney. I am by no means a programmer, and the results show it—but the bottom line is that it does the job.

Our son was going to visit relatives for two weeks, and we wanted to give them permission to have a doctor glue him back together, if he were to fall off his dirt bike.

This POA looked almost exactly like the one we got last year for our daughter to visit my sister, and an awful lot like the one we had for a friend to sell our car during one of our frequent moves. They could have been mass produced by a computer. (This is when the light bulb appeared over my head.)

On closer examination I saw the POA as a series of subroutines with variable strings of information inserted. The only difference between a POA to sell a car or one to authorize medical care was a single paragraph.

Since I had just picked up a Line Printer VII on sale and was anxious to see what it could do for me, I decided to have it print a Power of Attorney.

As things turned out, I got carried away and wrote instructions that offer five different Powers of Attorney:

1 - to sell an auto
2 - to register an auto
3 - to get medical care for a child
4 - to rent a house to someone
5 - to sell a house

In addition to that, it will print the Notary statement at the bottom, if you want it, and it will even include the name of the Notary, if you have it. Then it will give you the option to print a duplicate copy, again, only if you want it. This program is so user friendly that it even thanks you for allowing it to serve you.

One word of caution—these are simple Powers of Attorney; if your situation is complicated, or you are doing this as part of your business, consult a lawyer. Unless you have a simple situation, and the POA fits your needs EXACTLY, get professional help. But for 90 per cent of the times you will need a personal POA, this program will do just fine.

You will still have to get your POA notarized. Hmmmmm, I wonder how you go about having a Color Computer commissioned a Notary?

240	0441
675	0E31
END	1E9E

The listing:

```
5 CLS
10 CLEAR 500
15 'SPECIAL POWER OF ATTORNEY
20 'BY GLENN B KNIGHT, 1982
25 PRINT "THIS PROGRAM WILL CREA
TE A"
30 PRINT "SPECIAL POWER OF ATTOR
NEY FOR"
35 PRINT "ONE OF FIVE PURPOSES."
40 PRINT
45 PRINT "IT HAS BEEN PREPARED W
ITH THE"
50 PRINT "AID OF AN ATTORNEY AND
 SHOULD"
55 PRINT "BE SUITABLE--WHEN NOTA
RIZED--"
60  "FOR GENERAL APPLICATION"
65 PRINT
```

```
70 PRINT "IF THIS DOCUMENT DOES
NOT"
75 PRINT "APPEAR DIRECTLY APPLIC
ABLE TO"
80 PRINT "YOUR PARTICULAR SITUAT
ION,"
85 PRINT "CONSULT AN ATTORNEY."
90 PRINT
95 INPUT "PRESS [ENTER] WHEN REA
DY";E$
100 CLS
105 PRINT
110 PRINT "TURN ON PRINTER AND"
115  "ALIGN PAPER"
120 PRINT
125 INPUT "PRESS [ENTER] WHEN RE
ADY";F$
130 PRINT "STAND BY"
135 PRINT#-2, CHR$(31)
140 PRINT#-2, "SPECIAL POWER OF
ATTORNEY"
145 PRINT#-2, CHR$(30)
150 PRINT#-2, STRING$(80,42)
155 INPUT "NAME OF PERSON(S) GRA
NTING POA";N$
160 PRINT "STREET ADDRESS"
165 INPUT A$
170 INPUT "CITY";T$
175 INPUT "COUNTY";C$
180 INPUT "STATE";S$
```

```
185 PRINT "NAME OF APPOINTEE(S)"
190 INPUT AN$
195 PRINT "STREET ADDRESS"
200 INPUT AA$
205 INPUT "CITY";AT$
210 INPUT "COUNTY";AC$
215 INPUT "STATE";AS$
220 PRINT "DATE POA TO EXPIRE"
225 PRINT "(DAY MONTH YEAR)"
230 INPUT D$
235 CLS
240 PRINT "SELECT TYPE OF POWER
OF ATTORNEY"
245 PRINT "A=SELL AUTO"
250 PRINT "B=REGISTER AUTO"
255 PRINT "C=MEDICAL CARE FOR CH
ILD"
260 PRINT "D=LEASE REAL ESTATE"
265 INPUT "E=SELL REAL ESTATE";P
$
270 IF P$="A" GOTO 800
275 IF P$="B" GOTO 900
280 IF P$="C" GOTO 1100
285 IF P$="D" GOTO 1200
290 IF P$="E" GOTO 1300
295 TO 240
300 CLS:PRINT "PRINTING, PLEASE
STAND BY"
305 PRINT#-2, "KNOW ALL MEN BY T
HESE PRESENTS, that I, ";N$;"//"
```

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*All programs require Color ComputerTM (Tandy Corp.) or TDP System 100 ComputerTM (RCA Corp.).

```
310 PRINT#-2, "a legal resident
of ";A$;", ";T$;"//"
315 PRINT#-2,"County of ";C$;"
State of ";S$;"//"
320 PRINT#-2, "desiring to execu
te a SPECIAL POWER OF ATTORNEY h
ave made, constituted and"
325 PRINT#-2, "appointed, and by
 these presents do make, constit
ute and appoint"
330 PRINT#-2, AN$;" whose addres
s is ";AA$;", ";AT$
335 PRINT#-2, "County of ";AC$;"
 State of ";AS$
340 PRINT#-2, "my Attorney-in-Fa
ct to act as follows, GIVING AND
 GRANTING unto my said"
345 PRINT#-2, "attorney full pow
er to:"
350 RETURN
355 PRINT "(DO NOT USE COMMAS)"
360 RETURN
400 PRINT#-2, "FURTHER, I do aut
horize my aforesaid Attorney-in-
Fact to perform all"
405 PRINT#-2, "necessary acts in
 the execution of the aforesaid
authorization with the"
410 PRINT#-2, "same validity as
I could effect if personally pre
sent."
415 PRINT#-2, "Any act or thing
lawfully done hereunder by my sa
id attorney shall be binding"
420 PRINT#-2, "on myself and my
heirs, legal and personal repres
entatives, and assigns"
425 PRINT#-2, "PROVIDED, however
, that all business transacted h
ereunder for me or for my"
430 PRINT#-2, "account shall be
transacted in my name, and that
all indorsements and"
435 PRINT#-2, "instruments execu
ted by my said attorney for the
purpose of carrying out the"
440 PRINT#-2, "foregoing powers
shall contain my name, followed
by that of my said"
445 PRINT#-2, "attorney and the
designation 'Attorney-in-Fact'."
450 PRINT#-2, "FURTHER, unless s
ooner revoked or terminated by m
e, this Special Power of"
455 PRINT#-2, "Attorney shall be
come NULL and VOID from and afte
r ";D$;"."
460 PRINT#-2, "IN WITNESS WHEREO
F, I have hereunto set my hand a
nd seal this     day of"
465 PRINT#-2, "              19
    ."
470 PRINT#-2,""
475 PRINT#-2, "WITNESSPUTS:
                        --------
----------------------(SEAL)"
480 PRINT#-2,""
485 PRINT#-2, "-----------------
---------------       ";A$
490 PRINT#-2,""
495 PRINT#-2, "-----------------
---------------       ";T$;", ";
S$
500 PRINT#-2,""
505 PRINT#-2, "-----------------
---------------"
600 CLS
605 PRINT "DO YOU WISH TO HAVE T
HE NOTARY"
610 PRINT "STATEMENT ATTACHED?"
615 INPUT "Y OR N";Q$
620 IF Q$="N" GOTO 2000
625 PRINT#-2,""
630 PRINT#-2, STRING$(80,42)
635 PRINT "NAME OF NOTARY"
640 INPUT NN$
645  "STATE OF COMMISSION"
650 INPUT NS$
```

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```
655 PRINT "COUNTY"
660 INPUT NC$
665 PRINT "DATE COMMISSION EXPIR
ES"
670 PRINT "(DAY MONTH YEAR)"
675 INPUT NE$
33448 CLS:PRINT "PRINTING, PLEAS
E STAND BY"
685 PRINT#-2, "State of ";NS$
690 PRINT#-2, "County of ";NC$
695 PRINT#-2, "I, ";NN$;TAB(35);
"a Notary Public in and for the"
700 PRINT#-2, "County and State
aforesaid, do hereby certify tha
t on the     day of"
705 PRINT#-2, "              , 19
  , before me personally appeare
d";N$
710 PRINT#-2, "who is known by m
e to be the identical person who
 is described in, whose name"
715 PRINT#-2, "is subscribed to,
 and who signed and executed the
 foregoing instrument, and"
720 PRINT#-2, "having first made
 known to him the contents there
of, he personally acknowledged"
725 PRINT#-2, "to me that he sig
ned and sealed the same on the d
ate it bears as his true, free"
730 PRINT#-2, "and voluntary act
 and deed for the uses, purposes
 and considerations therein"
735 PRINT#-2, "set forth."
740 PRINT#-2, "In Witness Whereo
f, I have hereunto set my hand a
nd official seal this"
745 PRINT#-2, "day and year abov
e."
750 PRINT#-2,""
627 PRINT#-2,""
760 PRINT#-2,""
765 PRINT#-2, "      ---------------
-------------------------"
770 PRINT#-2, "
                "NN$;", Notary
Public"
775 PRINT#-2, "My Commission Exp
ires: ";NE$
780 GOTO 2000
800 CLS
805 PRINT "POA TO SELL AN AUTO"
810 GOSUB 355
815 PRINT "MINIMUM PRICE YOU WIL
L ACCEPT"
820 INPUT "$";S
825 GOSUB 1000
830 GOSUB 300
835 PRINT#-2, "Sell, in my name,
```

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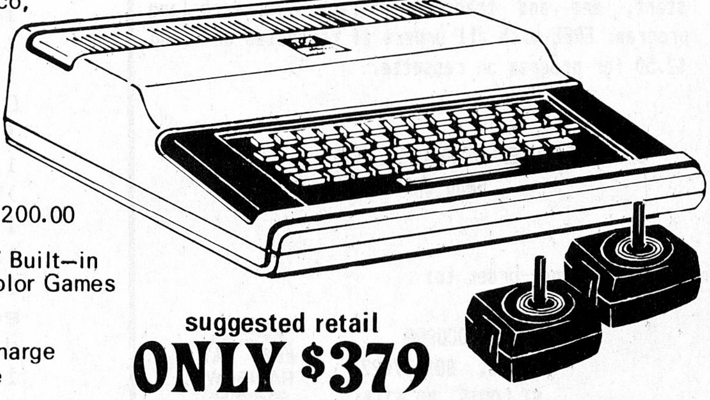

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```
 for a price not less than $";S
840 PRINT#-2, "a vehicle describ
ed as: ";SA$;" ";SB$;", ";SC$;",
 ";SD$
845 PRINT#-2, "VIN ";SE$;" ENGIN
E # "SF$
850 PRINT#-2, "and to transfer t
itle thereto.  I further authori
ze my Attorney-in-Fact"
855 PRINT#-2, "to do and perform
 any and all acts necessary in c
onnection with renewal"
860 PRINT#-2, "or cancellation,
in my name, of the registration
and/or insurance of"
865 PRINT#-2, "said automobile."
870 GOTO 400
900 CLS
905 PRINT "POA TO REGISTER AUTO"
910 GOSUB 355
915 GOSUB 1000
920 PRINT "STATE TO BE REGISTERE
D IN"
925       RG$
930 GOSUB 300
935 PRINT#-2, "Register, in my n
ame, the following described aut
omobile: "
940 PRINT#-2, SA$;" ";SB$;", ";S
C$;", ";SD$
945 PRINT#-2, "VIN ";SE$;" ENGIN
E # ";SF$
950 PRINT#-2, "in the state of "
;RG$;"."
955 GOTO 400
1000 PRINT "DESCRIBE VEHICLE"
1005 INPUT "MODEL YEAR";SA$
1010 INPUT "MANUFACTURER";SB$
1015 INPUT "TYPE";SC$
1020 INPUT "COLOR";SD$
1025 INPUT "VEHICLE ID NO";SE$
1030 INPUT "ENGINE NO";SF$
1035 RETURN
1100 CLS
1105 PRINT "POA FOR CHILD'S MEDI
CAL CARE"
1110 GOSUB 355
1115 PRINT "NAME(S) OF CHILD(REN
)"
1120 INPUT MA$
1125 GOSUB 300
1130 PRINT#-2, "Authorize and ex
ecute consent for any and all me
dical care and"
1135 PRINT#-2, "treatment, inclu
ding major surgery, deemed neces
sary by a duly licensed"
1140 PRINT#-2, "physician select
ed by my Attorney-in-Fact for th
e health and well being of my"
```

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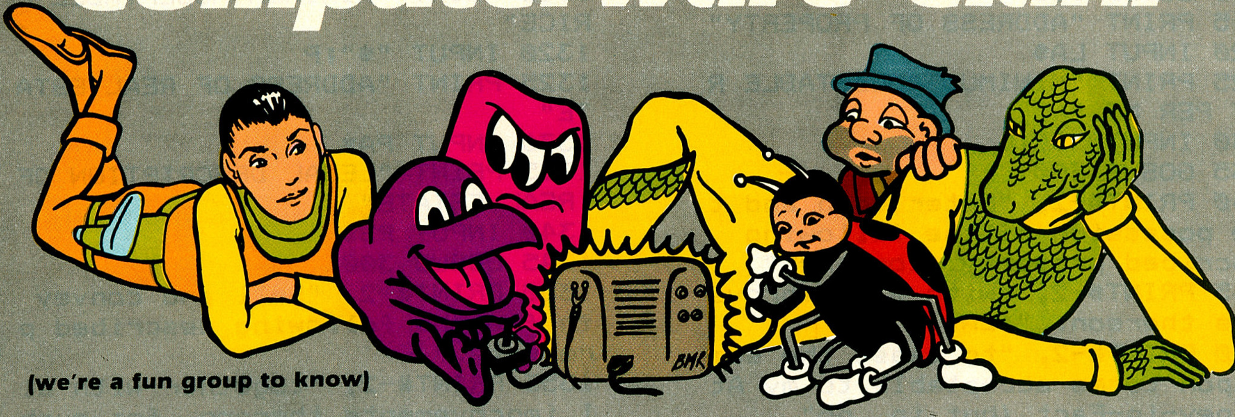

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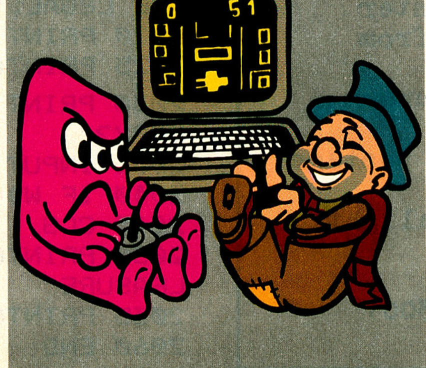

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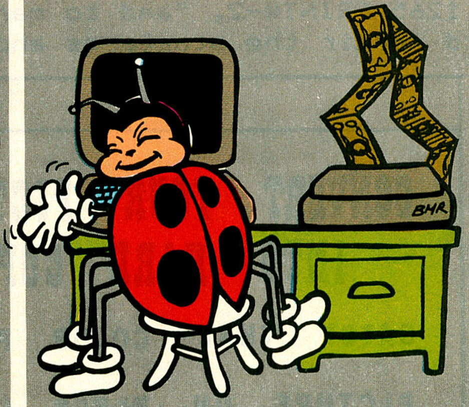

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```
1145 PRINT#-2, "following named
child(ren): ";MA$;"."
1150 GOTO 400
1200 CLS
1205 PRINT "POA FOR LEASE OF REA
L ESTATE"
1210 GOSUB 355
1215 PRINT "ADDRESS OF PROPERTY"
1220 INPUT LA$
1225 PRINT "MINIMUM ACCEPTABLE R
ENT PER MO."
1230 INPUT "$";L
1235 GOSUB 300
1240 PRINT#-2, "Enter upon and t
ake posession of the following
described property, together"
1245 PRINT#-2, "with all improve
mens thereon: ";LA$
1250 PRINT#-2, "to lease the sam
e upon terms acceptable to my At
torney-in-Fact (but in  no"
1255 PRINT#-2, "event shall such
 rental be less than $";L;" per
month);"
1260 PRINT#-2, "to collect, rece
ive and deposit to my credit the
 rents or income therefrom;"
1265 PRINT#-2, "and to manage an
d repair the stuctures and impro
vements thereon."
1270 GOTO 400
1300 CLS
1305 PRINT "POA TO SELL REAL EST
ATE"
1310 GOSUB 355
1315 PRINT "MINIMUM ACCEPTABLE P
RICE"
1320 INPUT "$";P
1325 PRINT "ADDRESS OF REAL ESTA
TE"
1330 INPUT PA$
1335 PRINT "LEGAL DESCRIPTION OF
 REAL ESTATE"
1340 INPUT PB$
1345 GOSUB 300
1350 PRINT#-2, "Sell and convey
in fee the following described p
roperty,"
1355 PRINT#-2, "together with al
l improvements thereon, for such
 amounts as he"
1360 PRINT#-2, "in his judgment
deems advisa!le, but not less th
an $";P;":"
1365 PRINT#-2, PA$
1370 PRINT#-2, PB$
1375 GOTO 400
1400 CLS:PRINT "ALIGN PAPER"
1405 INPUT "PRESS [ENTER] WHEN R
EADY";O$
1410 PRINT#-2, CHR$(31)
1415 PRINT#-2, "SPECIAL POWER OF
 ATTORNEY"
1420 PRINT#-2, CHR$(30)
1425 PRINT#-2, STRING$(80,42)
1500 IF P$="A" GOTO 830
1505 IF P$="B" GOTO 930
1510 IF P$="C" GOTO 1125
1515 IF P$="D" GOTO 1235
1520 IF P$="E" GOTO 1345
2000 CLS
2005 PRINT "YOUR SPECIAL POWER O
F ATTORNEY"
2010 PRINT "HAS BEENSOUNDPRINTED
.  YOU MUST"
2015 PRINT "HAVE IT NOTARIZED TO
 BE LEGAL."
2020 PRINT
2025 PRINT#-2, STRING$(80,42)
2030 PRINT "DO YOU WANT ANOTHER
COPY?"
2035 INPUT "(Y OR N)";W$
2040 IF W$="Y" GO TO 1400
2045 CLS
2050 PRINT@197, "IT HAS BEEN A P
LEASURE"
2055 PRINT@265, "SERVING YOU"
2060 END
```

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PRICE **$9.95** (tape)* **D**

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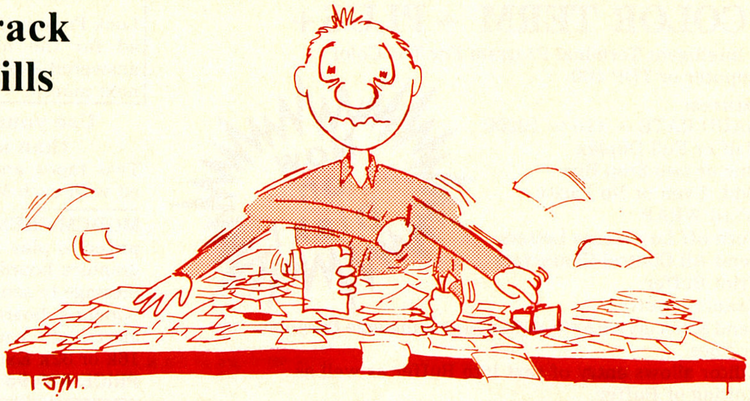
Let CoCo Keep Track Of Your Utility Bills

By Dennis H. Weide



With the rising cost of utility bills, it gets harder and harder to budget the family income. Here's a program that will help you keep track of your utility cost and usage.

All you do is enter the information from your utility bills and the program arranges it, computes totals, and prints it to the screen or printer as you request. It makes it easier to spot errors in billing as well as allow you to see the average monthly cost of your utilities.

While this program is written for the Albuquerque, NM, area, it can be applied to your area, too, with little or no modification.

It is not necessary to fill in all the data requested. Just fill in the information that is listed on your bill. The program uses REMark statements to show where specific sections are. Using these REMarks, you can find and change any headings necessary. It shouldn't be necessary to change any variables.

A Sample Printout

Now, let's look at the sample data printout. You can see that the first section of the printout deals with the electric bill summary. The next sections are for the gas bill and the water bill summaries. These list the data for the months you have entered. In these examples, I have used the actual data from my 1981 utility bill records. When you run this program, the computer will prompt you for the inputs in the same order as they are listed in the sample printout headers.

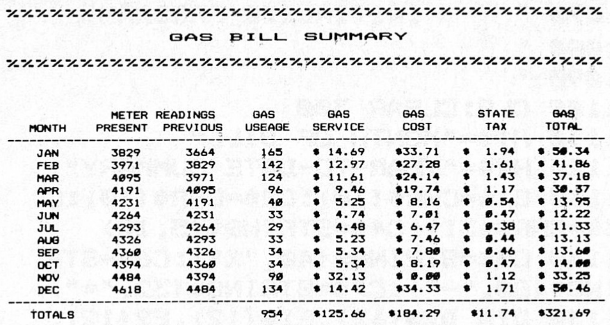
The final section is the summary for all utility costs. It prints out an amount for each utility for all 12 months, even if you have not made any entries for those months. The screen printout will be similar to the hardcopy, except that it will be in an abbreviated format and will list cost, usage and totals on three separate pages. This is because of the small screen size.

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

                     ELECTRIC  BILL  SUMMARY

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%


              METER READINGS   ELECTRIC  ELECTRIC   FUEL    STATE    ELECTRIC
  MONTH     PRESENT  PREVIOUS   USEAGE    CHARGE   ADJUST    TAX      TOTAL
--------------------------------------------------------------------------------
   JAN       27589    26833      756     $ 42.22  $14.17   $ 2.26   $ 58.65
   FEB       28212    27589      623     $ 35.42  $ 6.23   $ 1.67   $ 43.32
   MAR       28854    28212      642     $ 39.29  $ 5.69   $ 1.80   $ 46.78
   APR       29537    28854      683     $ 41.58  $ 9.67   $ 2.05   $ 53.30
   MAY       30180    29537      643     $ 39.35  $10.79   $ 2.01   $ 52.15
   JUN       30902    30180      722     $ 42.34  $11.61   $ 2.16   $ 56.11
   JUL       31720    30902      818     $ 48.54  $12.67   $ 2.14   $ 63.35
   AUG       32499    31720      779     $ 46.51  $12.06   $ 2.05   $ 60.62
   SEP       33217    32499      718     $ 43.15  $ 9.90   $ 1.86   $ 54.91
   OCT       33878    33217      661     $ 46.95  $ 0.39   $ 1.66   $ 49.00
   NOV       34494    33878      616     $ 43.89  $ 5.14   $ 1.72   $ 50.75
   DEC       35265    34494      771     $ 54.43  $ 5.65   $ 2.10   $ 62.18
--------------------------------------------------------------------------------
  TOTALS                        8432     $523.67  $103.97  $23.48   $651.12
```

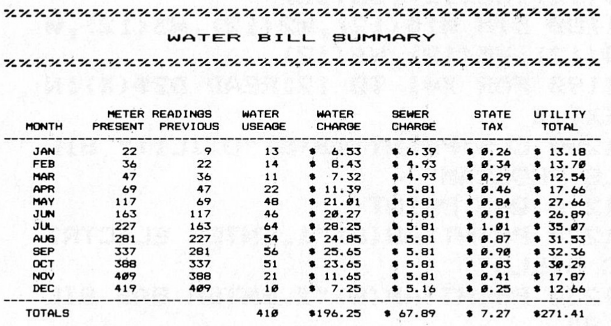


```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

            GAS  BILL  SUMMARY

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%


        METER READINGS    GAS     GAS      GAS     STATE    GAS
MONTH  PRESENT  PREVIOUS USEAGE SERVICE   COST      TAX    TOTAL
----------------------------------------------------------------
 JAN     3829     3664    165   $ 14.69  $33.71  $  1.94  $ 50.34
 FEB     3971     3829    142   $ 12.97  $27.28  $  1.61  $ 41.86
 MAR     4095     3971    124   $ 11.61  $24.14  $  1.43  $ 37.18
 APR     4191     4095     96   $  9.46  $19.74  $  1.17  $ 30.37
 MAY     4231     4191     40   $  5.25  $ 8.16  $  0.54  $ 13.95
 JUN     4264     4231     33   $  4.74  $ 7.01  $  0.47  $ 12.22
 JUL     4293     4264     29   $  4.48  $ 6.47  $  0.38  $ 11.33
 AUG     4326     4293     33   $  5.23  $ 7.46  $  0.44  $ 13.13
 SEP     4360     4326     34   $  5.34  $ 7.80  $  0.46  $ 13.60
 OCT     4394     4360     34   $  5.34  $ 8.19  $  0.47  $ 14.00
 NOV     4484     4394     90   $ 32.13  $ 0.00  $  1.12  $ 33.25
 DEC     4618     4484    134   $ 14.42  $34.33  $  1.71  $ 50.46
----------------------------------------------------------------
TOTALS                    954   $125.66 $184.29  $11.74  $321.69
```

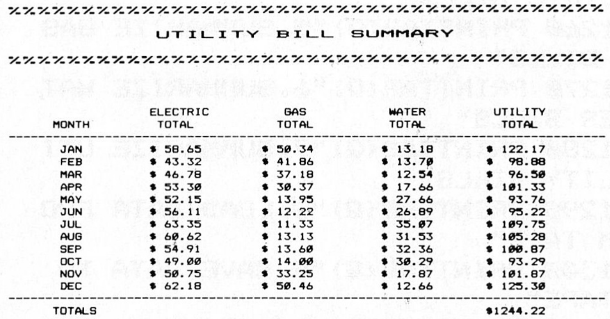


```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

           WATER  BILL  SUMMARY

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%


        METER READINGS   WATER    WATER    SEWER    STATE  UTILITY
MONTH  PRESENT  PREVIOUS USEAGE   CHARGE   CHARGE    TAX    TOTAL
-----------------------------------------------------------------
 JAN       22        9     13   $  6.53  $ 6.39   $ 0.26  $ 13.18
 FEB       36       22     14   $  8.43  $ 4.93   $ 0.34  $ 13.70
 MAR       47       36     11   $  7.32  $ 4.93   $ 0.29  $ 12.54
 APR       69       47     22   $ 11.39  $ 5.81   $ 0.46  $ 17.66
 MAY      117       69     48   $ 21.01  $ 5.81   $ 0.84  $ 27.66
 JUN      163      117     46   $ 20.27  $ 5.81   $ 0.81  $ 26.89
 JUL      227      163     64   $ 28.25  $ 5.81   $ 1.01  $ 35.07
 AUG      281      227     54   $ 24.85  $ 5.81   $ 0.87  $ 31.53
 SEP      337      281     56   $ 25.65  $ 5.81   $ 0.90  $ 32.36
 OCT      388      337     51   $ 23.65  $ 5.81   $ 0.83  $ 30.29
 NOV      409      388     21   $ 11.65  $ 5.81   $ 0.41  $ 17.87
 DEC      419      409     10   $  7.25  $ 5.16   $ 0.25  $ 12.66
-----------------------------------------------------------------
TOTALS                    410   $196.25  $ 67.89  $ 7.27  $271.41
```



```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

          UTILITY  BILL  SUMMARY

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%


           ELECTRIC       GAS          WATER        UTILITY
  MONTH     TOTAL        TOTAL         TOTAL         TOTAL
-----------------------------------------------------------
   JAN     $ 58.65      $ 50.34      $ 13.18      $ 122.17
   FEB     $ 43.32      $ 41.86      $ 13.70      $  98.88
   MAR     $ 46.78      $ 37.18      $ 12.54      $  96.50
   APR     $ 53.30      $ 30.37      $ 17.66      $ 101.33
   MAY     $ 52.15      $ 13.95      $ 27.66      $  93.76
   JUN     $ 56.11      $ 12.22      $ 26.89      $  95.22
   JUL     $ 63.35      $ 11.33      $ 35.07      $ 109.75
   AUG     $ 60.62      $ 13.13      $ 31.53      $ 105.28
   SEP     $ 54.91      $ 13.60      $ 32.36      $ 100.87
   OCT     $ 49.00      $ 14.00      $ 30.29      $  93.29
   NOV     $ 50.75      $ 33.25      $ 17.87      $ 101.87
   DEC     $ 62.18      $ 50.46      $ 12.66      $ 125.30
-----------------------------------------------------------
  TOTALS                                          $1244.22
```

Program Requirements

The program will run with 16K of RAM if the *REMarks* are deleted. It requires Extended Basic only because of the *PRINTUSING* statements. If you change these statements, you can run without Extended Basic.

The program was written to be used with a Line Printer VII. I have used printer control codes for those who wish to use this program with another type of printer. The codes are set in lines 1130 and 1140. Look at the following table for a list of the code functions:

Printer Code Functions
C1$=LINE FEED
C2$=NORMAL WIDTH PRINT
C3$=DOUBLE WIDTH PRINT
C4$=FIVE LINE FEEDS
C5$=DOUBLE WIDE HEADER
C6$=80 COLUMN LINE
C7$=FOR SCREEN PRINT

If your printer has a form-feed function, you can change C4$ to the code for FORM FEED (CHR$(12)). Change C6$ to reflect the column width of your printer. You should use at least an 80 column printer if you do not wish to make major program modifications. Also, change C2$ and C3$ to the values required for your printer.

You *must* enter the bills in chronological order; enter the January electric bill before entering the February electric bill. You can enter all of the electric bills before entering either gas or water bills or vice versa. If you enter the months out of order, the data on the summary sheets will also be out of order. The program matches the name of the month to the months listed in the data statements in the program to determine if the month was entered properly. If not, you will get a tone and a flashing warning and you will have to re-enter the month.

When you enter the actual cost of the utilities, do not use dollar signs ($). The program will automatically enter them for you.

Editing Data

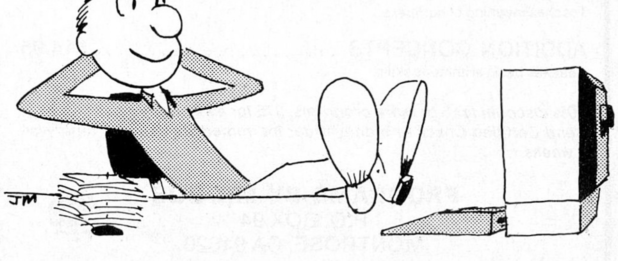
The program has no editor, but you can edit data by breaking the program and changing the incorrect variable. For example, assume that the electric charge for the March entry was incorrect. It shows that the electric charge was $39.29. Now, if you wanted to change it to $38.29, you would start by pressing *BREAK*. Look at the program listing. Entries for the electric bill start at line 1430. When you ran the program, you saw that the month of the bill is entered first followed by the base electric charge. Starting at line 1430, the first *INPUT* statement is E1$(E9) for the month. The second *INPUT* statement is E2(E9) for the electric charge. Since March is the third month, E9 will equal three. After you press *BREAK*, type the following to change the data

```
E2(3)=38.29:CONT
```

This will change the electric charge from $39.29 to $38.29 and restart the program. Press *ENTER* again to call the error routine, then answer the prompts. This type of data editing will work for all programs written in Basic as long as you don't have a syntax error. If you attempt to *RUN* the program instead of *CONTinuing* it, or, if you have a syntax error, the program pointers will be reset and the data will be lost.

A Final Word

The program is simple to use once you become familiar with it so give it a try after you have loaded it and saved a copy to tape. Try all combinations of inputs and check for error handling to insure that you have loaded it correctly.



When you are ready to use it for keeping your records, you will see how easy it will be to budget the utility bills. You will also have a program that your friends and neighbors might find useful. They will see that you can use your computer for much more than just playing games.

1320	03BA
1570	05E8
1960	092D
2440	0DD5
2910	1269
3380	1706
3970	1CD2
4440	20BC
4660	2265
5100	27CC
5400	2BC5
END	30A7

The listing:

```
1000 '    HOME UTILITY PROGRAM
1010 '            BY
1020 '      DENNIS H. WEIDE
1030 '         (C) 1982
1040 '
1050 '
1060 '
1070 '       INITIALIZE PROGRAM
1080 '
1090 '
1100 CLS:CLEAR 300
1110 H1$="MONTH OF BILL"
1120 H2$="YEAR-TO-DATE SUMMARY"
1130 C1$=CHR$(10):C2$=CHR$(30):C
3$=CHR$(31):C4$=STRING$(5,10)
1140 C5$=STRING$(40,"%"):C6$=STR
ING$(80,"-"):C7$=STRING$(32,"=")
1150 DIM D2$(12),E1$(12),E2(12),
E3(12),E4(12),E9(12)
1160 DIM E5(12),E6(12),TU(12),W1
(12)
1170 DIM G1$(12),G2(12),G3(12),G
4(12),G5(12),G6(12)
1180 DIM W1$(12),W2(12),W3(12),W
4(12),W5(12),W6(12)
1190 FOR X=1 TO 12:READ D2$(X):N
EXT X
1200 CLS:PRINTTAB(5)"UTILITY BIL
LS PROGRAM"
1210 Q=3:PRINT
1220 PRINTTAB(Q)"1.ENTER ELECTRI
C BILLS"
1230 PRINTTAB(Q)"2.ENTER GAS BIL
LS"
1240 PRINTTAB(Q)"3.ENTER WATER B
ILLS"
1250 PRINTTAB(Q)"4.SUMMARIZE ELE
CTRIC BILLS"
1260 PRINTTAB(Q)"5.SUMMARIZE GAS
 BILLS"
1270 PRINTTAB(Q)"6.SUMMARIZE WAT
ER BILLS"
1280 PRINTTAB(Q)"7.SUMMARIZE UTI
LITY BILLS"
1290 PRINTTAB(Q)"8.LOAD DATA FRO
M TAPE"
1300 PRINTTAB(Q)"9.SAVE DATA TO
TAPE"
1310 PRINTTAB(Q)"10.PRINT TO PRI
NTER"
1320 PRINTTAB(Q)"11.END RUN OF P
ROGRAM"
1330 GOSUB 3760:INPUT A
1340 ON A GOTO 1430,1630,1830,20
20,2500,2970,3440,4030,4280,4720
,5780
1350 CLS:GOSUB 3820:GOTO 1200
1360 GOSUB 3820
1370 GOTO 1200
1380 '
1390 '
1400 '       ELECTRIC BILL ENTRY
1410 '
1420 '
1430 CLS:PRINT:PRINTTAB(6)"ELECT
RIC BILL ENTRY"
1440 E9=E9+1:P0=0
```

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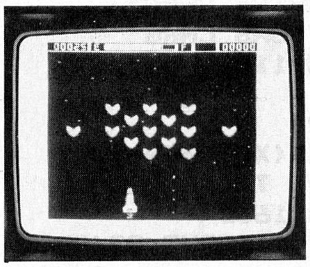

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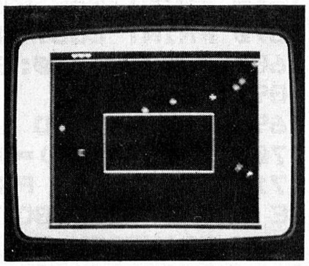

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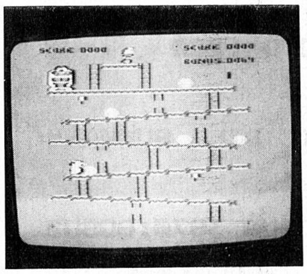

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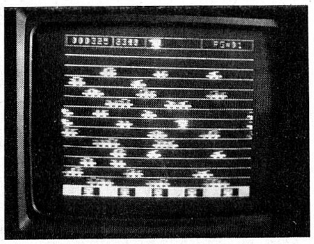

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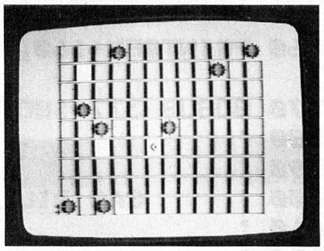

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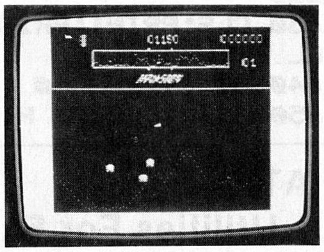

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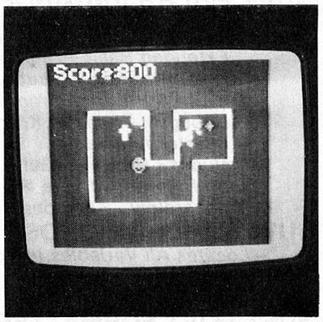

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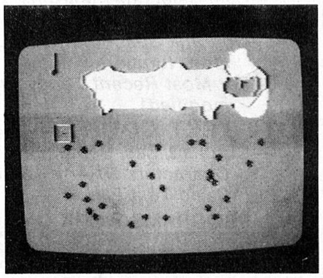

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```
1450 PRINT:PRINT H1$
1460 PRINT"BASE ELECTRIC CHARGE"
1470 PRINT"FUEL ADJUSTMENT"
1480 GOSUB 4610:EM=118:INPUT E1$
(E9)
1490 FOR X=1 TO 12:IF E1$(E9)=D2
$(X) THEN PO=1
1500 NEXT X:IF PO=1 THEN 1520
1510 GOSUB 3820:GOTO 1430
1520 PRINT@EM+32,"";:INPUT E2(E9
)
1530 PRINT@EM+64,"";:INPUT E3(E9
)
1540 PRINT@EM+96,"";:INPUT E4(E9
)
1550 PRINT@EM+128,"";:INPUT E5(E
9)
1560 PRINT@EM+160,"";:INPUT E6(E
9)
1570 GOSUB 3770:GOTO 1200
1580 '
1590 '
1600 '       GAS BILL ENTRY
1610 '
1620 '
1630 CLS:PRINT:PRINTTAB(9)"GAS B
ILL ENTRY"
1640 G9=G9+1:PO=0
1650 PRINT:PRINT H1$
```

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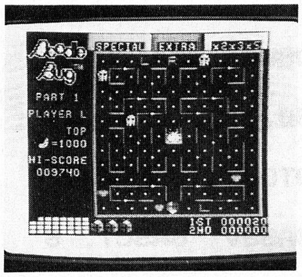
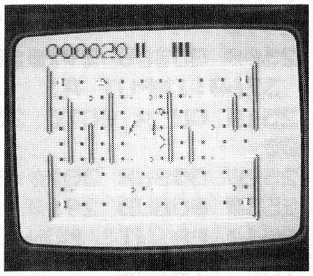
```
1660 PRINT"GAS SERVICE CHRG"
1670 PRINT"COST OF GAS CHRG"
1680 GOSUB 4610:EM=118:INPUT G1$
(G9)
1690 FOR X=1 TO 12
1700 IF G1$(G9)=D2$(X) THEN PO=1
1710 NEXT X:IF PO=1 THEN 1720 EL
SE GOSUB 3820:GOTO 1630
1720 PRINT@EM+32,"";:INPUT G2(G9
)
1730 PRINT@EM+64,"";:INPUT G3(G9
)
1740 PRINT@EM+96,"";:INPUT G4(G9
)
1750 PRINT@EM+128,"";:INPUT G5(G
9)
1760 PRINT@EM+160,"";:INPUT G6(G
9)
1770 GOSUB 3770:GOTO 1200
1780 '
1790 '
1800 '       WATER BILL ENTRY
1810 '
1820 '
1830 CLS:PRINT:PRINTTAB(8)"WATER
 BILL ENTRY"
1840 W9=W9+1:PO=0
1850 PRINT:PRINT H1$
1860 PRINT"BASE WATER CHARGE"
1870 PRINT"SEWER CHARGE"
1880 GOSUB 4610:WM=118:INPUT W1$
(W9)
1890 FOR X=1 TO 12:IF W1$(W9)=D2
$(X) THEN PO=1
1900 NEXT X:IF PO=1 THEN 1910 EL
SE GOSUB 3820:GOTO 1830
1910 PRINT@WM+32,"";:INPUT W2(W9
)
1920 PRINT@WM+64,"";:INPUT W4(W9
)
1930 PRINT@WM+96,"";:INPUT W5(W9
)
1940 PRINT@WM+128,"";:INPUT W6(W
9)
1950 PRINT@WM+160,"";:INPUT W1(W
9)
1960 GOSUB 3770:GOTO 1200
1970 '
1980 '
1990 '       ELECTRIC BILL SUMMARY
2000 '
2010 '
2020 GOSUB 2440:GOSUB 3870:GOSUB
 3760:INPUT A
2030 ON A GOTO 2050,2190,2320,12
00
2040 GOSUB 3820:GOTO 2020
2050 GOSUB 2440
2060 PRINT"MON   CHRGE  FUADJ
TAX  TOTAL"
```



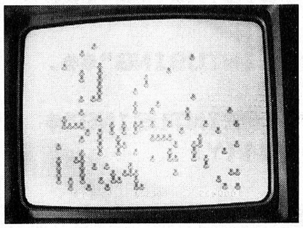
DOODLE BUG

DOODLE BUG is a machine language high resolution graphics game for one or two players who move their Ladybugs through an ever-changing maze gobbling dots and other items while avoiding Enemy bugs and Skulls. Excellent Graphics. Similar to Lock N' Chase™.
Tape... **$24.95** Disk... **$29.95**



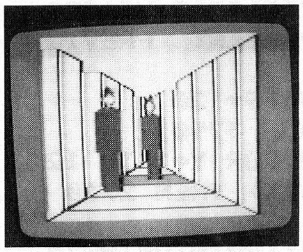
PACDROIDS

With its space theme, the Super Saucer lays destructomines and the Super Bomb that disintegrates everything in your path, right up to the wall. The maze changes every 10,000 points as the difficulty escalates. 1-4 players. 16K extended basic.
Tape **$19.95**



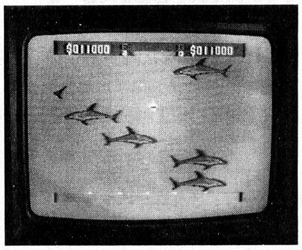
MEGAPEDE

Could this be the best Centipede yet? Computerwares new addition to the field, super graphics and sound.
Tape... **$21.95** Disk... **$26.95**



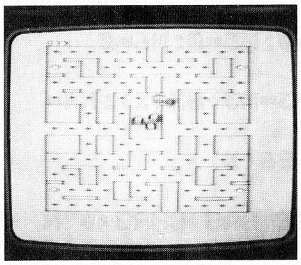
PHANTOM SLAYER

You must chase the phantoms and kill them with your assortment of weapons. This is a graphics type maze/adventure game with full screen three dimensional graphics. You are armed with a laser pistol, and proximity detector. 16K.
Tape **$19.95**



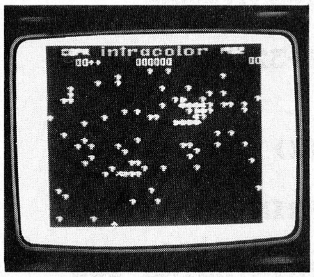
SHARK TREASURE

Dive down through the sharks and salvage the gold. Armed with special flash bombs you fight off the sharks. Excellent game. Great graphics, sound. From Computerware.
Tape... **$21.95** Disk... **$26.95**



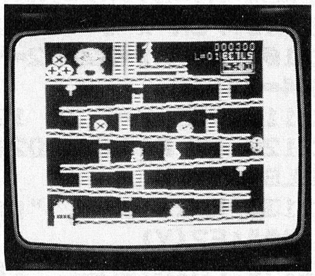
GHOST GOBBLER

Ghost Gobbler is an excellent version of Pac-Man™. You must gobble all the food dots while avoiding the ghosts. There are four energizer dots which will make the ghosts turn blue and become scared. This is the best copy of the arcade game. 16K.
Tape **$21.95**



COLORPEDE

Colorpede has a variety of bugs ranging from a tiny bettle to the gigantic colorpede. Colorpede has better graphics than Katerpillar but the sound is not as good. Colorpede also has a more varied and complicated play routine. 16K.
Tape **$29.95**



DONKEY KING

Using the four stages from the original acrade game, with your joystick in hand try to jump the barrels, collect the pins, manuever your way past the falling jacks, and figure out the crazy conveyor belts. Written by Tom Mix, this ones sure to become a classic! 32K.
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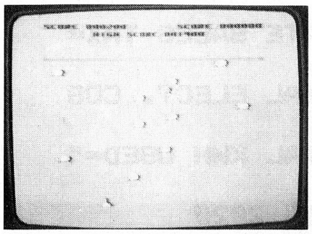
TOP TEN

1.) **DONKEY KING** by Tom Mix
2.) **COLORPEDE** by Intracolor
3.) **ASTRO BLAST** by Mark Data
4.) **DOODLE BUG** by Computerware
5.) **SPACE RACE** by Spectral Assoc.
6.) **PLANET INVASION** by Spectral Assoc.
7.) **PACDROIDS** by Programmers Guild
8.) **STARFIRE** by Inteltronics
9.) **HAYWIRE** by Mark Data
10.) **KATERPILLAR ATTACK** by Tom Mix

INVADERS REVENGE

You, as the last remaining space Invader, must battle the human ships that prowl the space lanes, and avoid the laser station that seeks to destroy you.A great game from Med. Systems. Reverses the roll in space invaders you attack the laser bases. 16K.
Tape **$19.95**



HAYWIRE

This is Mark Data's version of Beserk™. Super Colors and dynamite sound effects in this fast paced arcade game for one or two players. The exciting combination of angry robots an the Indestructible Menace will provide hours of action filled fun.
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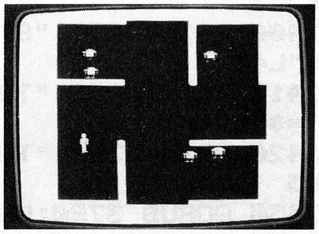

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```
2070 PRINT C7$:D=97:GOSUB 3790
2080 M1=69:M2=76:M3=83:M4=88
2090 FOR X=1 TO 12
2100 M1=M1+32:M2=M2+32:M3=M3+32:
M4=M4+32
2110 FOR Y=1 TO 12
2120 IF E1$(Y)=D2$(X) THEN 2130
ELSE 2170
2130 PRINT@M1,"";:PRINTUSING"$##
.##";E2(Y)
2140 PRINT@M2,"";:PRINTUSING"$##
.##";E3(Y)
2150 PRINT@M3,"";:PRINTUSING"$#.
##";E4(Y)
2160 PRINT@M4+2,"";:PRINTUSING"$
##.##";E2(Y)+E3(Y)+E4(Y);
2170 NEXT Y,X
2180 GOSUB 3780:GOTO 2020
2190 CLS:PRINTTAB(12)"KWH USED"
2200 PRINT" MON  PRESENT  PREVIO
US  USED"
2210 L7=101:L8=110:L9=120
2220 PRINT C7$:GOSUB 3790
2230 FOR X=1 TO 12
2240 FOR Y=1 TO 12
2250 IF E1$(Y)=D2$(X) THEN 2260
ELSE 2290
2260 PRINT@L7+2,"";:PRINTUSING"#
####";E5(Y)
2270 PRINT@L8+3,"";:PRINTUSING"#
####";E6(Y)
2280 PRINT@L9,"";:PRINTUSING"###
##";E5(Y)-E6(Y)
2290 NEXT Y:L7=L7+32:L8=L8+32:L9
=L9+32
2300 NEXT X
2310 GOSUB 3780:GOTO 2020
2320 GOSUB 4660
2330 L2=0:L3=0:L4=0:L5=0:L6=0
2340 FOR X=1 TO 12
2350 L2=L2+E2(X):L3=L3+E3(X):L4=
L4+E4(X)
2360 L5=L5+(E5(X)-E6(X))
2370 NEXT X
2380 PRINT@99,"BASE ELECT. CHRG=
$"L2
2390 PRINT@163,"FUEL ADJUSTMENT=
$"L3
2400 PRINT@227,"STATE SALES TAX=
$"L4
2410 PRINT@291,"TOTAL ELECT. COS
T=$"L2+L3+L4
2420 PRINT@355,"TOTAL KWH USED="
L5
2430 GOSUB 3780:GOTO 2020
2440 CLS:PRINTTAB(5)"ELECTRIC BI
LL SUMMARY":RETURN
2450 '
2460 '
2470 '      GAS BILL SUMMARY
2480 '
2490 '
2500 GOSUB 2910:GOSUB 3870:GOSUB
 3760:INPUT A
2510 ON A GOTO 2530,2670,2790,12
00
2520 GOSUB 3820:GOTO 2500
2530 GOSUB 2910
2540 PRINT" MON  GASSV  GASCT  S
TAX  TOTAL"
2550 PRINT C7$:D=97:GOSUB 3790
2560 M1=69:M2=76:M3=83:M4=88
2570 FOR X=1 TO 12
2580 M1=M1+32:M2=M2+32:M3=M3+32:
M4=M4+32
2590 FOR Y=1 TO 12
2600 IF G1$(Y)=D2$(X) THEN 2610
ELSE 2650
2610 PRINT@M1,"";:PRINTUSING"$##
.##";G2(Y)
2620 PRINT@M2,"";:PRINTUSING"$##
.##";G3(Y)
2630 PRINT@M3,"";:PRINTUSING"$#.
##";G4(Y)
2640 PRINT@M4+1,"";:PRINTUSING"$
##.##";G2(Y)+G3(Y)+G4(Y)
2650 NEXT Y,X
2660 GOSUB 3780:GOTO 2500
2670 CLS:PRINTTAB(12)"GAS USAGE"
2680 PRINT" MON  PRESENT  PREVIO
US  USED"
2690 F7=101:F8=110:F9=120
2700 PRINT C7$:GOSUB 3790
2710 FOR X=1 TO 12:FOR Y=1 TO 12
2720 IF G1$(Y)=D2$(X) THEN 2730
ELSE 2760
2730 PRINT@F7+2,"";:PRINTUSING"#
###";G5(Y)
2740 PRINT@F8+3,"";:PRINTUSING"#
###";G6(Y)
2750 PRINT@F9,"";:PRINTUSING"###
#";G5(Y)-G6(Y)
2760 NEXT Y
2770 F7=F7+32:F8=F8+32:F9=F9+32
2780 NEXT X:GOSUB 3780:GOTO 2500
2790 GOSUB 4660
2800 N2=0:N3=0:N4=0:N5=0:N6=0
2810 FOR X=1 TO 12
2820 N2=N2+G2(X):N3=N3+G3(X):N4=
N4+G4(X)
2830 N5=N5+(G5(X)-G6(X))
2840 NEXT X
2850 PRINT@99,"BASE GAS CHRG=$"N
2
2860 PRINT@163,"COST OF GAS CHRG
=$"N3
2870 PRINT@227,"STATE SALES TAX=
$"N4
```

- COMPUTER SHACK -

COLOR DFT (Direct File Transfer) Disk or Tape

At last a terminal program for the color computer that allows you to send and receive machine language programs without any conversion routines. Send directly from disk to disk or tape to disk. DFT will send and receive any type of program machine language, basic, text files, data files etc. from a color computer, Model I, Model II' or a Bullet 80 system. DFT has a chat mode and has software controlled half and/or full duplex. You must have a modem in order to use DFT.

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```
2880 PRINT@291,"TOTAL GAS COST=$
"N2+N3+N4
2890 PRINT@355,"TOTAL UNITS USED
="N5
2900 GOSUB 3780:GOTO 2500
2910 CLS:PRINTTAB(8)"GAS BILL SU
MMARY":RETURN
2920 '
2930 '
2940 '      WATER BILL SUMMARY
2950 '
2960 '
2970 GOSUB 3380:GOSUB 3870:GOSUB
 3760:INPUT A
2980 ON A GOTO 3000,3130,3260,12
00
2990 GOSUB 3820:GOTO 2970
3000 GOSUB 3380
3010 PRINT"MON   WATER  SEWER  T
AX   TOTAL"
3020 PRINT C7$:D=97:GOSUB 3790
3030 M1=69:M2=76:M3=83:M4=88
3040 FOR X=1 TO 12
3050 M1=M1+32:M2=M2+32:M3=M3+32:
M4=M4+32
3060 FOR Y=1 TO 12
3070 IF W1$(Y)=D2$(X) THEN 3080
ELSE 3120
3080 PRINT@M1,"";:PRINTUSING"$##
.##";W2(Y)
3090 PRINT@M2+1,"";:PRINTUSING"$
#.##";W4(Y)
3100 PRINT@M3,"";:PRINTUSING"$#.
##";W5(Y)
3110 PRINT@M4+1,"";:PRINTUSING"$
##.##";W2(Y)+W4(Y)+W5(Y);
3120 NEXT Y,X:GOSUB 3780:GOTO 29
70
3130 CLS:PRINTTAB(6)"UNITS OF WA
TER USED"
3140 PRINT" MON  PRESENT  PREVIO
US  USED"
3150 P7=103:P8=113:P9=120
3160 PRINT C7$:GOSUB 3790
3170 FOR X=1 TO 12:FOR Y=1 TO 12
3180 IF W1$(Y)=D2$(X) THEN 3190
ELSE 3220
3190 PRINT@P7,"";:PRINTUSING"###
#";W6(Y)
3200 PRINT@P8,"";:PRINTUSING"###
#";W1(Y)
3210 PRINT@P9,"";:PRINTUSING"###
#";W6(Y)-W1(Y)
3220 NEXT Y
3230 P7=P7+32:P8=P8+32:P9=P9+32
3240 NEXT X
3250 GOSUB 3780:GOTO 2970
3260 GOSUB 4660
3270 P2=0:P4=0:P5=0:P6=0
3280 FOR X=1 TO 12
3290 P2=P2+W2(X):P4=P4+W4(X):P5=
P5+W5(X)
3300 P6=P6+(W6(X)-W1(X))
3310 NEXT X
3320 PRINT@99,"BASE WATER CHRG=$
"P2
3330 PRINT@163,"SEWER CHARGE=$"P
4
3340 PRINT@227,"STATE SALES TAX=
$"P5
3350 PRINT@291,"TOTAL WATER COST
=$"P2+P3+P4+P5
3360 PRINT@355,"TOTAL UNITS USED
="P6
3370 GOSUB 3780:GOTO 2970
3380 CLS:PRINTTAB(6)"WATER BILL
SUMMARY":RETURN
3390 '
3400 '
3410 '       UTILITY BILLS SUMMARY
3420 '
3430 '
3440 CLS:PRINTTAB(6)"SUMMARY OF
UTILITITES"
3450 PRINT"MON  ELECT   GAS   WA
TER  TOTAL"
3460 PRINT C7$
3470 FOR X=1 TO 12
```

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```
3480 TU(X)=0:NEXT X
3490 GOSUB 3790
3500 Q1=101:Q2=107:Q3=113:Q4=121
3510 FOR X=1 TO 12
3520 FOR Y=1 TO 12
3530 IF E1$(Y)=D2$(X) THEN 3540
ELSE 3560
3540 PRINT@Q1-1,"";:PRINTUSING"$
##.##";E2(Y)+E3(Y)+E4(Y)
3550 TU(X)=TU(X)+E2(Y)+E3(Y)+E4(
Y)
3560 IF G1$(Y)=D2$(X) THEN 3570
ELSE 3590
3570 PRINT@Q2,"";:PRINTUSING"$##
.##";G2(Y)+G3(Y)+G4(Y)
3580 TU(X)=TU(X)+G2(Y)+G3(Y)+G4(
Y)
3590 IF W1$(Y)=D2$(X) THEN 3600
ELSE 3620
3600 PRINT@Q3+1,"";:PRINTUSING"$
##.##";W2(Y)+W4(Y)+W5(Y)
3610 TU(X)=TU(X)+W2(Y)+W4(Y)+W5(
Y)
3620 NEXT Y
3630 Q1=Q1+32:Q2=Q2+32:Q3=Q3+32
3640 NEXT X:Q4=120
3650 FOR X=1 TO 12
3660 IF TU(X)<1 THEN 3680
3670 PRINT@Q4+1,"";:PRINTUSING"$
###.##";TU(X);
3680 Q4=Q4+32:NEXT X:GOSUB 3780:
CLS:TB=0
3690 FOR X=1 TO 12
3700 TB=TB+TU(X):NEXT X
3710 CLS:PRINT:PRINTTAB(5)"YEARL
Y UTILITY SUMMARY"
3720 PRINT:PRINT:PRINTTAB(2)"TOT
AL UTILITY COST=";:PRINTUSING"$#
###.##";TB
3730 GOSUB 3780:GOTO 1200
3740 PRINT"  MON     CHARGE    TA
X     TOTAL"
3750 PRINT D7$;:RETURN
3760 PRINT@450,"ENTER ONE OF THE
 ABOVE";:RETURN
3770 '
3780 PRINT@482,"PRESS <ENTER> TO
 CONTINUE";:INPUT Q:RETURN
3790 D=97:FOR S=1 TO 12
3800 PRINT@D-1,D2$(S):D=D+32:NEX
T S:RETURN
3810 RETURN
3820 FOR X=1 TO 10:CLS
3830 FOR T=1 TO 50:NEXT T
3840 PRINT@233,"ILLEGAL ENTRY":S
OUND 100,1
3850 FOR Y=1 TO 50:NEXT Y,X:CLS:
RETURN
3860 RETURN
```

```
3870 PRINT:PRINT:PRINTTAB(6)"1.S
UMMARIZE CHARGES"
3880 PRINT:PRINTTAB(6)"2.SUMMARI
ZE USEAGE"
3890 PRINT:PRINTTAB(6)"3.YEAR-TO
-DATE SUM"
3900 PRINT:PRINTTAB(6)"4.RETURN
TO MAIN LIST"
3910 RETURN
3920 FOR X=1 TO 12
3930 IF E1$(X)=D2$(X) THEN RETUR
N
3940 IF G1$(X)=D2$(X) THEN RETUR
N
3950 IF W1$(X)=D2$(X) THEN RETUR
N
3960 NEXT X:Y1=1:GOSUB 3820:RETU
RN
3970 DATA JAN,FEB,MAR,APR,MAY,JU
N,JUL,AUG,SEP,OCT,NOV,DEC
3980 '
3990 '
4000 '       LOAD DATA FROM CASSET
TE
4010 '
4020 '
4030 CLS:PRINT C7$;:IF ZQ=1 THEN
 4500
4040 PRINTTAB(11)"LOAD DATA":PRI
NT C7$
4050 PRINT:PRINTTAB(7)"1. LOAD D
ATA TAPE"
4060 PRINT:PRINTTAB(7)"2. PRESS
PLAY ONLY"
4070 PRINT:PRINTTAB(7)"3. PRESS
ENTER"
4080 LINE INPUT ZZ$
4090 CLS:PRINT:PRINT:PRINT:PRINT
 C7$;
4100 PRINTTAB(6)"YOU ARE LOADING
 DATA":PRINT C7$
4110 OPEN"I",-1,"NEW"
4120 INPUT#-1,E9,G9,W9
4130 FOR X=1 TO 12
4140 INPUT#-1,E1$(X),E2(X),E3(X)
,E4(X),E5(X),E6(X)
4150 INPUT#-1,G1$(X),G2(X),G3(X)
,G4(X),G5(X),G6(X)
4160 INPUT#-1,W1$(X),W1(X),W2(X)
,W4(X),W5(X),W6(X)
4170 NEXT X
4180 CLOSE#-1
4190 ZQ=1
4200 GOTO 1200
4210 N3=N3+N1
4220 N4=N4+N2
4230 '
4240 '
4250 '       SAVE DATA TO CASSETTE
```

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```
4260 '
4270 '
4280 CLS:PRINT C7$;
4290 PRINTTAB(11)"SAVE DATA":PRI
NT C7$
4300 PRINT:PRINTTAB(7)"1. LOAD D
ATA TAPE"
4310 PRINT:PRINTTAB(7)"2. PRESS
RECORD & PLAY"
4320 PRINT:PRINTTAB(7)"3. PRESS
ENTER"
4330 LINE INPUT ZZ$
4340 CLS:PRINT:PRINT:PRINT:PRINT
 C7$;
4350 PRINTTAB(6)"YOU ARE SAVING
DATA":PRINT C7$
4360 OPEN"O",-1,"NEW"
4370 PRINT#-1,E9,G9,W9
4380 FOR X=1 TO 12
4390 PRINT#-1,E1$(X),E2(X),E3(X)
,E4(X),E5(X),E6(X)
4400 PRINT#-1,G1$(X),G2(X),G3(X)
,G4(X),G5(X),G6(X)
4410 PRINT#-1,W1$(X),W1(X),W2(X)
,W4(X),W5(X),W6(X)
4420 NEXTX
4430 CLOSE#-1
4440 GOTO1200
4450 '
4460 '
4470 '       DATA RELOAD ERROR
4480 '
4490 '
4500 CLS:PRINT@64,C7$:PRINT:PRIN
T
4510 PRINTTAB(6)"DATA ALREADY LO
ADED":PRINT
4520 PRINTTAB(2)"DO YOU WANT TO
RELOAD? (Y/N)";
4530 FORII=1TO10:SOUND100,3:NEXT
4540 LINE INPUT KK$
4550 IF KK$="Y" THEN 4030 ELSE 1
200
4560 '
4570 '
4580 '      INPUT PRINT ROUTINE
4590 '
4600 '
4610 PRINT"STATE SALES TAX"
4620 PRINT"PRESENT METER READ"
4630 PRINT"PREVIOUS METER READ"
4640 PRINT:PRINT:PRINTTAB(10)"MA
KE ENTRIES"
4650 PRINT@118,"";:RETURN
4660 CLS:PRINTTAB(6)"YEAR-TO-DAT
E SUMMARY":RETURN
4670 '
4680 '
4690 '       PRINTER ROUTINE
4700 '
4710 '
4720 CLS:PRINT:PRINT C7$;
4730 PRINTTAB(12)"PRINTING":PRIN
T C7$
4740 C9$="ELECTRIC":C8=9:GOSUB 5
840
4750 PRINT#-2,TAB(14)"METER READ
INGS";TAB(31)"ELECTRIC";TAB(41)"
ELECTRIC";
4760 PRINT#-2,TAB(53)"FUEL";TAB(
63)"STATE";TAB(71)"ELECTRIC"
4770 PRINT#-2,TAB(3)"MONTH";TAB(
12)"PRESENT";TAB(21)"PREVIOUS";T
AB(32)"USEAGE";
4780 PRINT#-2,TAB(42)"CHARGE";TA
B(52)"ADJUST";TAB(64)"TAX";TAB(7
2)"TOTAL"
4790 PRINT#-2,C6$
4800 T1=0:T2=0:T3=0:T4=0
4810 FOR X=1 TO E9
4820 T1=T1+E5(X)-E6(X):T2=T2+E2(
X)
4830 T3=T3+E3(X):T4=T4+E4(X)
4840 IF E1$(X)="" THEN 4930
4850 PRINT#-2,TAB(4);E1$(X);TAB(
12)"";
4860 PRINT#-2,USING"######";E5(X
);:PRINT#-2,TAB(22)"";
4870 PRINT#-2,USING"######";E6(X
```

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```
);:PRINT#-2,TAB(33)"";
4880 PRINT#-2,USING"####";E5(X)-
E6(X);:PRINT#-2,TAB(41)"";
4890 PRINT#-2,USING"$###.##";E2(
X);:PRINT#-2,TAB(52)"";
4900 PRINT#-2,USING"$##.##";E3(X
);:PRINT#-2,TAB(62)"";
4910 PRINT#-2,USING"$##.##";E4(X
);:PRINT#-2,TAB(71)"";
4920 PRINT#-2,USING"$###.##";E2(
X)+E3(X)+E4(X)
4930 NEXT X:PRINT#-2,C6$
4940 PRINT#-2,TAB(3)"TOTALS";TAB
(33)"";
4950 PRINT#-2,USING"####";T1;:PR
INT#-2,TAB(41)"";
4960 PRINT#-2,USING"$###.##";T2;
:PRINT#-2,TAB(51)"";
4970 PRINT#-2,USING"$###.##";T3;
:PRINT#-2,TAB(62)"";
4980 PRINT#-2,USING"$##.##";T4;:
PRINT#-2,TAB(71)"";
4990 PRINT#-2,USING"$###.##";T2+
T3+T4
5000 PRINT#-2,C4$
5010 C9$="GAS":C8=11:GOSUB 5840
5020 PRINT#-2,TAB(14)"METER READ
INGS";TAB(33)"GAS";TAB(43)"GAS";
5030 PRINT#-2,TAB(53)"GAS";TAB(6
3)"STATE";TAB(73)"GAS"
5040 PRINT#-2,TAB(3)"MONTH";TAB(
12)"PRESENT";TAB(21)"PREVIOUS";T
AB(32)"USEAGE";
5050 PRINT#-2,TAB(41)"SERVICE";T
AB(53)"COST";TAB(64)"TAX";TAB(72
)"TOTAL"
5060 PRINT#-2,C6$
5070 T1=0:T2=0:T3=0:T4=0
5080 FOR X=1 TO G9
5090 T1=T1+G5(X)-G6(X):T2=T2+G2(
X)
5100 T3=T3+G3(X):T4=T4+G4(X)
5110 IF G1$(X)="" THEN 5200
5120 PRINT#-2,TAB(4);G1$(X);TAB(
12)"";
5130 PRINT#-2,USING"######";G5(X
);:PRINT#-2,TAB(22)"";
5140 PRINT#-2,USING"######";G6(X
);:PRINT#-2,TAB(33)"";
5150 PRINT#-2,USING"####";G5(X)-
G6(X);:PRINT#-2,TAB(41)"";
5160 PRINT#-2,USING"$###.##";G2(
X);:PRINT#-2,TAB(52)"";
5170 PRINT#-2,USING"$##.##";G3(X
);:PRINT#-2,TAB(61)"";
5180 PRINT#-2,USING"$###.##";G4(
X);:PRINT#-2,TAB(71)"";
5190 PRINT#-2,USING"$###.##";G2(
X)+G3(X)+G4(X)
5200 NEXT X:PRINT#-2,C6$
5210 PRINT#-2,TAB(3)"TOTALS";TAB
(33)"";
5220 PRINT#-2,USING"####";T1;:PR
INT#-2,TAB(41)"";
5230 PRINT#-2,USING"$###.##";T2;
:PRINT#-2,TAB(51)"";
5240 PRINT#-2,USING"$###.##";T3;
:PRINT#-2,TAB(62)"";
5250 PRINT#-2,USING"$##.##";T4;:
PRINT#-2,TAB(71)"";
5260 PRINT#-2,USING"$###.##";T2+
T3+T4
5270 PRINT#-2,C4$
5280 C9$="WATER":C8=11:GOSUB 584
0
5290 PRINT#-2,TAB(14)"METER READ
INGS";TAB(32)"WATER";TAB(42)"WAT
ER";
5300 PRINT#-2,TAB(52)"SEWER";TAB
(63)"STATE";TAB(71)"UTILITY"
5310 PRINT#-2,TAB(3)"MONTH";TAB(
12)"PRESENT";TAB(21)"PREVIOUS";T
AB(32)"USEAGE";
5320 PRINT#-2,TAB(42)"CHARGE";TA
B(52)"CHARGE";TAB(64)"TAX";TAB(7
2)"TOTAL"
5330 PRINT#-2,C6$
5340 T1=0:T2=0:T3=0:T4=0
5350 FOR X=1 TO W9
5360 T1=T1+W6(X)-W1(X):T2=T2+W2(
X)
5370 T3=T3+W4(X):T4=T4+W5(X)
5380 IF W1$(X)="" THEN 5470
5390 PRINT#-2,TAB(4);W1$(X);TAB(
12)"";
5400 PRINT#-2,USING"######";W6(X
);:PRINT#-2,TAB(22)"";
5410 PRINT#-2,USING"######";W1(X
);:PRINT#-2,TAB(33)"";
5420 PRINT#-2,USING"####";W6(X)-
W1(X);:PRINT#-2,TAB(41)"";
5430 PRINT#-2,USING"$###.##";W2(
X);:PRINT#-2,TAB(52)"";
5440 PRINT#-2,USING"$##.##";W4(X
);:PRINT#-2,TAB(62)"";
5450 PRINT#-2,USING"$##.##";W5(X
);:PRINT#-2,TAB(71)"";
5460 PRINT#-2,USING"$###.##";W2(
X)+W5(X)+W4(X)
5470 NEXT X:PRINT#-2,C6$
5480 PRINT#-2,TAB(3)"TOTALS";TAB
(33)"";
5490 PRINT#-2,USING"####";T1;:PR
INT#-2,TAB(41)"";
5500 PRINT#-2,USING"$###.##";T2;
:PRINT#-2,TAB(51)"";
5510 PRINT#-2,USING"$###.##";T3;
:PRINT#-2,TAB(62)"";
```

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```
5520 PRINT#-2,USING"$##.##";T4;:
PRINT#-2,TAB(71)"";
5530 PRINT#-2,USING"$###.##";T2+
T3+T4
5540 C9$="UTILITY":C8=10:GOSUB 5
840:T4=0
5550 PRINT#-2,TAB(19)"ELECTRIC";
TAB(37)"GAS";TAB(51)"WATER";
5560 PRINT#-2,TAB(65)"UTILITY"
5570 PRINT#-2,TAB(6)"MONTH";TAB(
20)"TOTAL";TAB(36)"TOTAL";TAB(51
)"TOTAL";
5580 PRINT#-2,TAB(66)"TOTAL":PRI
NT#-2,C6$
5590 FOR X=1 TO 12
5600 PRINT#-2,TAB(7)D2$(X);
5610 T1=E2(X)+E3(X)+E4(X)
5620 T2=G2(X)+G3(X)+G4(X)
5630 T3=W2(X)+W4(X)+W5(X)
5640 PRINT#-2,TAB(19)"";:PRINT#-
2,USING"$###.##";T1;
5650 PRINT#-2,TAB(34)"";:PRINT#-
2,USING"$###.##";T2;
5660 PRINT#-2,TAB(50)"";:PRINT#-
2,USING"$###.##";T3;
5670 T4=T4+T1+T2+T3
5680 PRINT#-2,TAB(64)"";:PRINT#-
2,USING"$####.##";T1+T2+T3
5690 NEXT X
5700 PRINT#-2,C6$
5710 PRINT#-2,TAB(6)"TOTALS";TAB
(64)"";:PRINT#-2,USING"$####.##"
;T4
5720 GOTO 1200
5730 '
5740 '
5750 '     MANUAL PROGRAM STOP
5760 '
5770 '
5780 CLS:STOP:CLS:GOTO 1200
5790 '
5800 '
5810 '     PRINTER ROUTINE
5820 '
5830 '
5840 PRINT#-2,C3$;C4$;C5$;C1$
5850 PRINT#-2,TAB(C8)C9$+" BILL
SUMMARY"
5860 PRINT#-2,C1$;C5$;C2$
5870 PRINT#-2,C1$;C1$
5880 RETURN
```

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Software Review...

Starship Hercules: Well Documented, Sophisticated Fun

Although I am not an avid game player, my son Philip (age 10) and I enjoyed this space game, *Starship Hercules*— a refreshing change from the Pac-Man and Space Assault type of games which are so popular. The lower skill levels allowed us to learn the basics of the game; the more advanced levels offered us a real challenge and a chance to develop playing strategies. While learning, we needed to refer frequently to the detailed instruction booklet (27 pages). It always provided the desired information. The following paragraphs describe the game and its documentation.

The game is written in BASIC and requires 21K of RAM (hence a 32K Color Computer). Most of the game is played viewing a screen that shows both an area map (quadrant— explained below) around the Starship Hercules and important data. The quadrant map displays the Hercules and any stars, starbases, or Zargons in that quadrant. The symbols are not generated using any of the graphics modes—they are produced using the various ASCII codes above &H7F.

As captain of the Starship Hercules, I am commissioned to seek out and destroy the invading Zargon spaceships. I have limited amounts of energy, weapons, and time to do this. These enemy ships are hiding in an 8 quadrant by 8 quadrant matrix (the Buffer Zone), which I can search, one quadrant at a time.

To aid me, I have the Hercules' shipboard computer, which performs several functions:

1. It gives me navigation data to the Starbases (space stations) where I can get refueled and additional weapons. Any damaged Hercules systems can also be repaired at these Starbases.
2. It shows me what I have found in already-explored quadrants, and which quadrants I have yet to explore.
3. It calculates navigational data (speed and direction) from my present location to any other quadrant.
4. It gives me a status report—energy and time remaining, Zargons remaining, and the status of all Hercules systems.

Once I find one (or more) Zargons, the Hercules computer calculates the firing angles for my photon torpedoes (if neither the computer nor my weapons systems have been damaged in a recent battle).

Each time I play the game, I am offered a choice of difficulty levels. At the more difficult levels, the Zargons move from quadrant to quadrant, they have more energy (which means they're harder to destroy), and they use a special weapon to reduce my defenses. In addition, the Hercules systems (navigation, computer, weapons, and defense) break down more frequently and take longer to repair. While these systems are damaged, I must rely on my own memory and resourcefulness to outwit the Zargons.

The number of Zargon ships (and their locations, of course) vary in each game, as does the number and location of the Starbases for refueling, rearming, and repairing the Hercules. And the Stardates (time allowed to destroy the Zargon fleet) differ in each game.

Particularly important for a game as complicated as *Starship Hercules* are the instructions. In this case, the 27-page booklet details every aspect of the game. Philip (my 10 year old son) lacked the patience to read them—this game is apparently intended for older (and more patient) readers of teen age or older. The only deficiency I noted was the rather poor quality of the illustrations (made with a printer, using symbols different from those in the game) and their placement all together at the end of the booklet; it would have been less confusing to place each diagram near the text it illustrated.

In summary, Philip and I both enjoyed this game. The few points about which I was still confused after reading the complete instructions were quickly cleared up when we began to play. I definitely consider *Starship Hercules* worth the retail price.

(Aardvark, 2352 S. Commerce, Walled Lake, MI 48088, $19.95 on tape)

—Jerry Oefelein

Software Review...

Galactic Hangman Can Get You Hooked

Looking for a fun game? One that takes some thinking, is educational, and the whole family can enjoy? Sugar Software has come up with a fun, space-age version of the popular game of Hangman. The program *Galactic Hangman* comes with both a 16K and 32K version on the same tape. Both versions have Sugar's auto-load feature built in, which makes the tape easy to load quickly. The idea of a 16K and 32K version on the same tape is ideal for those of you who have 16K now but plan to upgrade sometime in the future.

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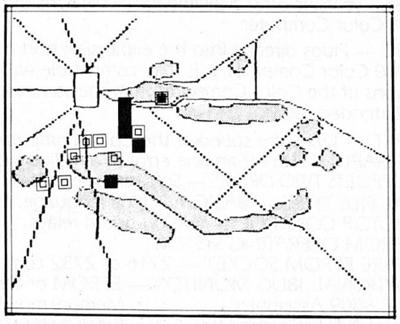

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First, let's talk about the 16K version. After loading, the computer instructs you to choose one of 14 different files of 50 words each that are part of the program. You are then instructed to choose between a word from the computer's memory and one of your own. All the letters of the alphabet appear at the top of the screen and change color as they are chosen. I won't discuss the graphics except to say that they are good, fun, and entertaining. Provision is made in the 16K version for creating and storing as many 50 word files as you wish to recall later on.

Except for the file recall feature, the 32K version has all the features of the 16K version, plus many others. The graphics are more "galactic" and the computer chooses randomly from 700 everyday words that are stored in the memory. The words appear to be well chosen and of average difficulty. This is the problem with many hangman-type games—the words are either too simple or too uncommon. Also, with the 32K version, if you load the tape and take no more action, the computer automatically begins choosing words and playing against itself giving a complete demonstration of how the game is played.

One feature which could be added to make the game more exciting would be the addition of a time clock. An additional letter would have to be chosen, say within 20 seconds or you have to move up one more step to the hangman's noose.

The documentation is good, both in the instruction booklet and on the tape. *Galactic Hangman* is recommended for, among others, those looking for a game that you can play with your grandparents and convince them that buying you that expensive CoCo was a wise thing to do.

(Sugar Software, 2153 Leah Lane, Reynoldsburg, OH 43068, $14.95)

—Tom Johnson

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Software Review...

Match-It Works Well With Young Learners

By Brian James

Match-It is an educational program from Micro School Programs (Bertamax Inc.) to help children learn to recognize which upper and lower case alphabet letters belong to each other. Suggested for youngsters from age four to six, *Match-It* comes in both cassette and disk media for the 32K computer. Although the disk version was used for this review, it appears the cassette version is exactly the same.

In *Match-It*, a letter appears on the left side of the screen while letters of the opposite case appear, one at a time, on the right side of the screen. When the correct letter match finally appears on the right, the user presses the space bar to indicate a match. The computer will indicate a correct answer with a happy face and an incorrect match with a sad face. Sound is also used in conjunction with the happy/sad faces. After all 26 letters have been given and matched, a record of how many tries it took to match each letter should appear on the screen along with a "goodbye" to the user. I say "should" because in reality the screen only indicates with a "1+" which letters had one or more misses. This was the only major discrepancy I could find in an otherwise excellent documentation booklet that comes with the program.

Before the program begins in earnest, the user (or parent or teacher) is prompted to decide on a number of options. These include whether upper or lower case letters will appear on the left side of the screen, in what order the letters are to appear (alphabetical or random) and at what speed are the letters on the right side to alternate. The user may also try an example problem before beginning the 26 letter sequence. The documentation suggests that an adult should explain the object of the program to the user, and help select order, level and speed of the program. This is a very wise suggestion considering the age level of the children using the program.

How well does it work? I tested it with my seven year old daughter and although she is one year older than the suggested age level, she liked the program very much. The greatest appeal seemed to be the nicely done graphics and the immediate feedback the program gives you through sound and color. She had a little problem reading some of the characters (made with lower resolution blocks) and a big problem trying to do the program at the highest speed. I found the highest speed hard also. The space bar didn't quite respond as fast as the program wanted it to.

In summary, *Match-It* is a good teaching program to help children learn to recognize upper and lower case letters. Even though the program is written in BASIC, it uses a very nice upper and lower case character set to print instructions and prompts. The age levels suggested (four through six) are perfect for the activity presented. I have heard that Micro School Programs is converting most of their educational programs for use on the 80C. This program illustrates the appealing quality color graphics and sound have in the educational area and how well suited the Color Computer is as a learning tool for children. Parents and educators would do well to write the company for a list of their 80C programs.

(Micro School Programs-Bertamax Inc., 101 Nickerson St., Suite 202, Seattle, WA 98109, $34.80 disk, $29.90 tape, 32K)

—Brian James

A WORD FROM THE SPONSOR

Hi again. This is Month Three in my series of short chats about various Color computer subjects in these Star-Kits ads. Hope you are finding them interesting and useful.

Quite often, after running a machine language program, I find that my CoCo doesn't want to accept Basic programs. The common solution, of course, is to turn the power off and then back on. This does a complete reset of the computer and fixes some of the pointers which the machine language program clobbers.

But here's a better way that doesn't put your computer through the power on/off stress: simply type POKE 113,3 and push the RESET button on the back. The POKE makes Basic forget that it has already been reset before, so pushing the RESET forces it to go through the same complete reset as if power had first been applied.

In fact, I have one Basic program which does several CLEARs and PCLEARs that leave the computer in a state where it won't run other programs unless everything is reset. To avoid the need to manually reset the system after this program is finished, I added one last line which reads POKE 113,3 : EXEC 40999. The EXEC restarts Basic exactly the same as if I had pressed RESET (except for one difference — in a 64K system you must physically press RESET to return from 64K mode back to 32K mode after running a 64K program.)

Are you using a non — Radio Shack tape recorder with your CoCo? If so, then it's quite possible that the motor control relay in your CoCo is not able to handle the recorder motor current. When that happens, the computer can't turn off the motor because the relay contacts have welded together. The new CoCo models have a better motor control relay to fix the problem, but what about the rest of us?

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Screen Control

By R. N. Roberts

Unfortunately, I'm seldom able to express myself in tidy little sentences of 32 characters or less, and frequently my print lines do runneth over to the next line on the TV screen. Nothing wrong with that, but when a word gets split in the process, I see Color Code 4 (to you beginners and unfortunates with other machines that's red). I hate to think of the time I've spent counting characters and inserting blanks in print statements in order to push a split word back to the start of the next line. If you feel the same, the following subroutine (named *Screen Control*) will provide relief.

Another equally useful feature of *Screen Control* is its ability to automatically stop printing when the screen is full. This feature lets you view text printed by a program one screen at a time. No longer do you have to sit with your fingers on the "shift" and "@" keys, poised like a cobra to strike in that one split second when the new lines reach the top of the screen. (It is unfortunate that there is not a similar routine in ROM for use when listing a Basic program.) *Screen Control* eliminates the need to count how many lines will fill a creen and then insert the familiar:

PRINT "HIT ENTER TO CONTINUE"; INPUT A$:CLS

Using Screen Control

To use *Screen Control*, first *CLEAR* 500 bytes of string storage space. The extra memory is the price paid for the subroutine. Next set the string you want to print equal to Z$ and execute a *GOSUB* to the subroutine. (I reserve the use of the letter Z for variables used in utility programs to avoid inadvertently using a variable in a program and a utility at the same time.) That's all there is to it.

> ***"No longer do you have to sit with your fingers on the 'shift' and '@' keys, poised like a cobra to strike in that one split second..."***

A semicolon placed at the end of a *PRINT* string will cause the following material to start printing at the end of the first string. The same effect is achieved in *Screen Control* by directing the *GOSUB* to line 150. For the same effect as a *PRINT* without the semicolon, *GOSUB* to line 140.

If you enter the subroutine with a string which would normally cause the screen to scroll, *Screen Control* will print as much of the string as it can, print a prompt on the bottom line and then beep. Hitting the *ENTER* key will clear the screen and the remainder of the string will be printed at the top of the screen. If you use lower case letters for the prompt it will readily attract the eye of the user. If you use this subroutine in a program which does not have to be very user friendly you might consider changing the prompt to "more" or even "—)".

Should you desire to disable the screen paging feature, replace lines 290 and 310 with *RETURN* statements and delete line 300. To use the page control part of the program only, set your strings equal to ZZ$ and execute a *GOSUB* to line 290.

As listed, statements 20 to 130 are not necessary to the operation of the program. If you *RUN* the program after keying it in, lines 20 to 130 illustrate the working of the subroutine. After you experiment with the program you will want to delete them.

How It Works

All you folks who only want to copy and compute can go to work now. From here on out, it's going to be a nuts and bolts discussion of how the program works. First, the variables used are defined in Table 1.

Table 1

SCREENCL variables

ZW—Flag for printing. 0=Print; 1=Print
Z$ —Text string to be processed
ZZ$—The part of Z$ to be printed
ZL—Print positions between cursor location and end of line
ZS—Number of characters in string Z$
ZR—Number of unprinted characters in string.

Next a review of the *POS* function. *POS*(0) returns the position of the cursor on a screen line. The values returned by *POS*(0) are "0" for the start of a line and "31" for the end of a line.

The *POS* function only tells where the cursor is in a line. In order to completely establish the location of the cursor on the screen, it is necessary to get the cursor address from memory locations 136 and 137. Memory addresses require two bytes of storage and are converted to a decimal value by the formula:

256**PEEK*(1st byte)+*PEEK*(2nd byte)

or, in this case:

Cursor address=256**PEEK*(136)+*PEEK*(137)

The cursor address will be a number between 1024 and 1535, the beginning and end of text screen memory.

If you do not have Extended Color Basic, the *POS* function can be duplicated by the following code used as a subroutine:

```
1000 PO=256*PEEK(136)+PEEK(137)
```

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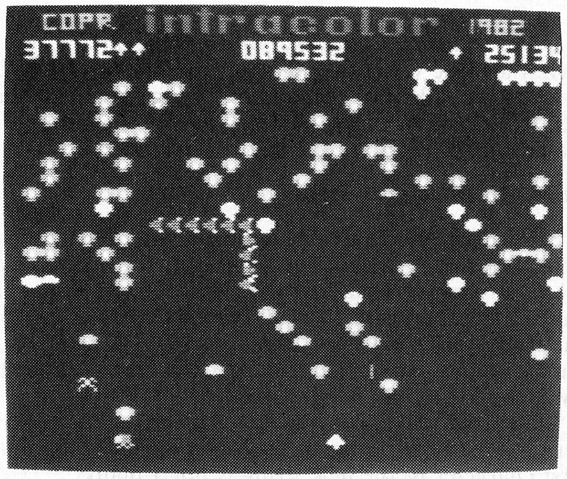

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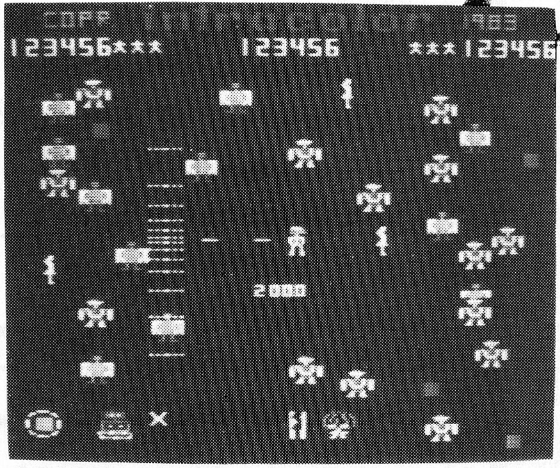

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1010 PO=PO-32*_INT_(PO/32)
1020 Return

Upon return from this subroutine the variable PO will have the same value as would be returned by _POS_(0).

Statement 10 clears the required string space. Statements 140 to 280 are the string handling part of the program and statements 290-310 are the page control sections.

String Handling Subsection

Statement 140 sets ZW=1 indicating that semicolon type printing is not desired. ZW is checked in statement 270 after all the string is printed. Statement 270 will return control to the calling program if ZW=0, leaving the cursor at the end of the string. Otherwise, line 280 resets ZW to zero and, if the cursor is not on the last line, skips to the start of the next line by executing a _PRINT_ statement.

Statement 150 adds a blank to the end of a string on the screen if the cursor is not at the beginning of the line and the first character of the new string is not a blank.

Statement 160 deletes a leading blank from a string if the string will be printed at the beginning of a line. If you want to indent a line, use one more leading blank than you would when using a regular _PRINT_ command. ZL is set equal to the number of print positions between the cursor and the end of the line in statement 170. Statement 180 sets ZS equal to the number of characters in the string to be printed.

Statement 190 prints the string if it will fit between the cursor and the end of the line. Printing in this statement, as well as other statements, is done by setting the string to be printed equal to ZZ$ and executing a _GOSUB_ to statement 290, the page control part of the program. If printing occurs at statement 190, all the string has been printed and control goes to statement 270 which, as mentioned above, determines if semicolon printing is required.

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Statements 200 through 240 are the heart of the program. If the character which would be printed at the end of the line or the next character is a blank, then a word is not split. In this case, the original string, Z$, is broken in two parts. The left part is printed in the balance of the line the cursor is on, ZR is set equal to the number of unprinted characters, and control goes to statement 210 which redefines Z$ as the right part of the string and starts the process over again by transferring control to line 150.

If the character which would print at the end of the line and the next character are not blanks, then a word is split and control goes to statement 220 which steps backward through the string starting at the end of line character until it finds a blank or reaches the start of the string. When a blank is found, the left portion of the string up to that point is printed on the line the cursor is on. ZR is then set equal to the number of unprinted characters and control goes to statement 210. If a blank is not found, it means that the word is too big for the space remaining in the line, and control passes to statement 250 which skips to the next line unless the cursor is on the last line. Issuing a _PRINT_ command when the cursor is on the last line will cause the top line to scroll off the screen which, of course, is a no-no. If the cursor is on the last line, control goes to the page control section of the subroutine to print the prompt.

Page Control Subsection

Statement 290 is the first line of the page control section. If the present cursor location plus the length of the string to be printed is greater than 1512 then control goes to statement 310 to print the prompt. 1512 is the text screen address a few characters before the prompt. Color Basic users can replace the _LINE INPUT_ instruction in statement 310 with an _INPUT_ statement. I used _LINE INPUT_ to avoid printing the question mark after the prompt. After the user responds, the screen is cleared, the waiting string is printed at the top of the screen, and control returns to the main program.

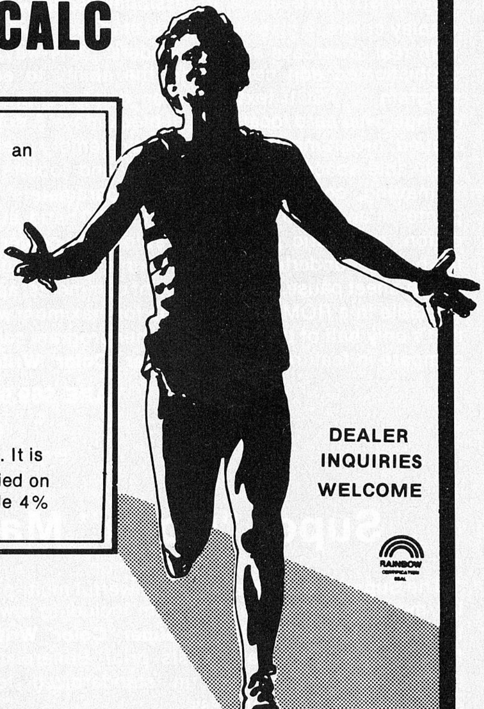
That's all there is to it. Now you can have neat text displays with a minimum of programming effort.

90 0283
200 0557
END 06BC

The listing:

```
10 CLEAR500
20 '****************************
30 'SCREEN CONTROL BY R.ROBERTS
   8/82
40 '****************************
50 CLS
60 Z$="LINES 20 THROUGH 130 ARE
NOT NEEDED FOR THE SUBROUTINE. T
HEY DEMONSTRATE HOW THE SUBROUTI
NE WORKS. THE FIRST TIME THIS ST
RING APPEARS IT IS SHOWN AS IF P
RINTED BY A PRINT STATEMENT. THE
 SECOND TIME IS THE SUBROUTINE'S
 WORK.
70 PRINTZ$:PRINT:GOSUB140
```

```
80 GOSUB310
90 Z$="THIS STRING CONTAINS 245
CHARACTERS AND FILLS ABOUT 8 SCR
EEN LINES. ONE STRING THIS SIZE
WILL FILL ABOUT HALF THE SCREEN.
 USING THIS SUBROUTINE ELIMINATE
S THE NEED FOR SEVERAL PRINT STA
TEMENTS IN A PROGRAM JUST TO ASS
URE PROPER SPACING AND FORMA
100 GOSUB140:GOSUB310:Z$="DO YOU
 KNOW THAT YOU DON'T HAVE TO PUT
 A QUOTATION MARK AT THE END OF
A STRING IF IT WILL BE THE LAST
CHARACTER IN THE LINE?":GOSUB140
110 Z$="NEXT A DEMONSTRATION OF
HOW A LINE CAN BE PUT AT THE END
 OF THE PRECEEDING LINE OR HOW I
T CAN START A NEW LINE. THE DIFF
ERENCE BEING WHICH LINE THE GOSU
B CALLS.":GOSUB150
120 Z$="THIS IS AN ADD ON LINE T
HE FIRST TIME IT APPEARS. THE SE
COND TIME IT STANDS ALONE.":T$=Z
$:GOSUB140:Z$=T$:GOSUB140
130 GOTO130
140 ZW=1 '***HERE FOR PRINT
150 IFPOS(0)<>0ANDLEFT$(Z$,1)<>"
 " THENPRINT" "; '***HERE FOR PR
INT;
160 IFPOS(0)=0ANDLEFT$(Z$,1)=" "
THENZ$=RIGHT$(Z$,LEN(Z$)-1)
170 ZL=32-POS(0)
180 ZS=LEN(Z$)
190 IF ZS<=ZL THENZZ$=Z$:GOSUB29
0:GOTO270
200 IF MID$(Z$,ZL,1)=" " ORMID$(
Z$,ZL+1,1)=" " THENZZ$=LEFT$(Z$,
ZL):GOSUB290:ZR=ZS-ZL ELSE220
210 Z$=RIGHT$(Z$,ZR):GOTO150
220 FOR ZR=ZL TO 1 STEP -1
230 IF MID$(Z$,ZR,1)=" "THENZZ$=
LEFT$(Z$,ZR):GOSUB290:ZR=LEN(Z$)
-ZR:GOTO210
240 NEXTZR
250 IF256*PEEK(136)+PEEK(137)+LE
N(ZZ$)<1503 THENPRINTCHR$(8):GOT
O150
260 GOSUB310:GOTO150
270 IF ZW=0 THENRETURN
280 ZW=0:IF256*PEEK(136)+PEEK(13
7)>1503 THENRETURN ELSEPRINT" ";
CHR$(8):RETURN
290 IF256*PEEK(136)+PEEK(137)+LE
N(ZZ$)>1512 THENGOSUB310
300 PRINTZZ$;:RETURN
310 PRINT@490,"hit enter to cont
inue";:SOUND200,1:LINEINPUTZI$:C
LS:RETURN
```



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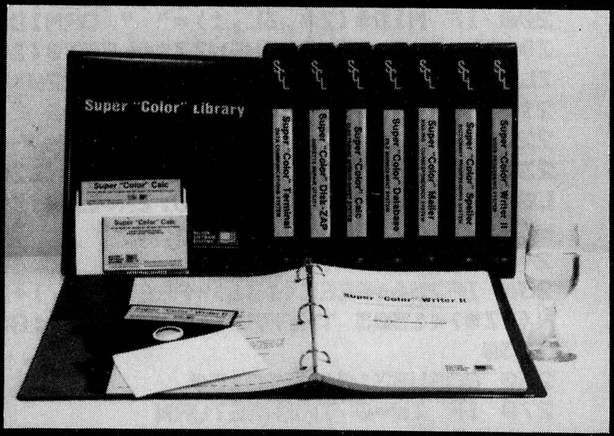

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Software Review...

Final Countdown

Save The World—Don't Blow It

By Paula Giese

When I first started gaming, I didn't do too well. I was always trying to HUG DWARF, KISS GIANT (I like big guys), or FEED DRAGON (an endangered species, after all). And though I like Adventuring, the constant need to KILL, STAB, SHOOT, HIT, and so on, is wearisome. The hero-gamer always seems to be a man, often bent on rescuing some tedious, chunky little princess-type who's tied up someplace. Off-putting for us tall, fast-moving ladies.

In real life, I am a private detective; I do have what I suppose some would consider "adventures." In real life, these are boring, scary, cold, slow, heartbreaking. Most are best handled with a smile, fundamental respect for people, and a cool head. I don't carry a gun. I've worked to end war for a long time, so shoot 'em-ups and galactic war games hardly thrill me, though unlike the present Administration, I don't think video games are causing kids to beat up on (or shoot) their folks any more than usual. Hence, I was delighted to see a game whose purpose was for the protagonist to *prevent* a war, rather than to knock out some alleged baddies with smart bombs, lasers, and what-not; or to get anti-social against ethnic minorities (dwarves, ogres) with more old-fashioned technologies.

Bill and Debbie Cook have written an interesting all-text Adventure called *Final Countdown* which starts you outside a missile base, where a crazed General is about to launch a nuke, targeting Moscow and starting World War Final, if you can't abort the thing.

You have to get into the base—there's automatic security at the gate. Then, find the right tools as you make your way through secret passages, mazes, adminstrative offices, and a variety of techno-rooms, to the place where you can abort the launch. That is, if you don't launch it yourself, by mistake, or get killed by making mistakes with the hi-tech gadgetry or by using the wrong tools at the wrong time. Computers, a two-way radio, and radar screens give you some scoop, if you interrogate them right. You can ask for HELP, but you won't get much.

From time to time, the crazed General pops up. If you don't get him, he'll get you, then that's all, world. Still, true to your anti-death principles, while you *do* shoot him (if you see him in time), it's with a Taser gun, a techno device developed out of the old electric cattle prod, once beloved of Southern sheriffs. Although cop catalogs advertise them, they're not much good. Most are sold to easy marks through ads in masculine righteous-violence fantasy mags like *Soldier of Fortune*. Nonetheless, your Taser causes the General to run off whimpering for a little while. But he keeps randomly popping up. You have only five shots before your battery is dead.

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I typed something a bit off-color the first time my Taser quit. This didn't phase the program, which told me primly, "Your French is not impressive." There is a subroutine prepared (named '&%$!' ()$%$! ! !) for a couple of other "French" words you might happen to use. Like other subroutines, or modules, it's introduced with a name—REM, so unravelling the BASIC spaghetti into components of the program is fairly easy, if you want to analyze it later.

In *Final Countdown* you're racing against a countdown, a given number of turns before there's a rumble, the earth opens, the missile launches, and bye-bye. You can ask: SCORE? for how many turns you have remaining. "How can you worry about points at a time like this?" the program chides you—but it tells. There are three levels of difficulty—Novice, Average, Expert, all menu-selected. Experts get less time and more appearances of the psycho General, so it remains playable against time and previous scores even after you've "solved" it. You can QUIT at any time, but you can't SAVE games part-way through for later resumption from where you were.

There are no graphics, in a way disappointing, but what can you "show" for the end of the world? And a modest "NICE GOING" with your score is surely all the reward you need for winning, what with your world-savior's glow and all. Trumpets, flashing screens, Presidential citations would be, ah, overkill. By the way, don't expect any help from the White House in this game. When you find and USE the Red Phone—the White House hotline—a recorded message tells you it's after working hours, call back the next day, after doomsday.

A nice feature is the fixed-screen status window, protected by a machine-language routine *POKEd* into the main BASIC program. The window shows the "current scene" and direction choices, and is updated to reflect the results of each move you make, including taking objects. On the "action screen," the two-thirds lying below the window, you talk to the program and it answers you. The previous commands and replies scroll upwards till they go behind the window, so half-a-dozen previous moves and replies stay visible. This is a great help in mazes and learning the routes through the missile base. "INVentory" will tell you what you're carrying at any time, at the cost of a countdown penalty.

The General will suddenly pop up randomly in the window, while you're busy reading or typing on the action screen, below, and may not notice him. If you make your next move without Tasering him, he's gotcha, that's it.

This "pop into the status window" technique is the program's main formal novelty. Such an updating status window is common on large business and word-processing applications programs, and in the new $50 million Apple LISA. In Adventures, though, it permits the use of random game factors to which the player can immediately respond, with varying results, an effect I hope to see other Adventures use, as it adds a lot of interest. The usual random game factor just knocks you out, handicaps, or (rarely) helps you in a fixed way; there's nothing you can do about it, the factor's outcome is predetermined in its effect on the game.

What the Cooks have done, in effect, is invent not a new technical, but a new literary device. They use it here in a very simple way, but later it can be developed with more complexity (random factors interacting with and altering screen-scene status; interacting with other game characters; new forms of Magic). What it does—or can do—is add a new dimension to what distinguishes computer games from little books or short films—the interactiveness of the story and you, the protagonist of that story.

The main program is in BASIC, so you can "cheat" by

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LLISTing it to learn verbs, objects, places, and outcomes. It's for a 16K ECB machine; on a 32K machine you need not *PCLEAR* before *CLOADING*. A backup program is supplied on the cassette. The program is warranted against defects for 60 days after purchase. I found a couple of *apparent* bugs. Occasionally, the program would tell me, "WOW! LOOK WHAT YOU FOUND!" But no matter how much I LOOKed or EXAMined, I couldn't find out what. Nor did various TAKEs or MOVEs, or GOs (with different objects) produce anything but "NOT RELEVANT." Additionally, you can OPEN certain things or EXAMine them when you're not really in their presence—a kind of ESP view of them—though you can't affect them unless you're there—a bug in the OPEN/EXAMine routines which makes it easy to cheat in certain ways, but seems unintended.

In summary, an interesting game, with a unique focus on taking risks to prevent war, rather than glorying in it. Though if you blunder (as I did), you must shoulder the responsibility for the nuclear destruction which follows, giving rise to some philosophical reflections on peace strategies, perhaps. (Although the General has it all set up to go anyway, all you do is speed up the end a bit.)

After playing it a while, by myself and with a drop-out priest who became an antiwar activist in the Vietnam era, and is now a programmer punching COBOL most nights, I was a byte disappointed. I expected too much, probably, of a game like this. I remembered hearing Father Daniel Berrigan speak in 1981, after he and the others of the Plowshare Eight had been convicted for entering the General Electric Plant at King of Prussia, Pennsylvania, smashing a number of Mark 12A multiple nuclear-warhead nose cones and pouring blood on them. Here's what he said:

> "After much prayer and reflection, we
> eight decided that it was here and now
> for us. It was time to come down from
> being teachers, priests, writers, etc.,
> and try to do something which might make
> a modest real difference in the world.
> "Our religious tradition offers to
> life a slight edge over death, now. I
> often ponder what to say to be of help.
> It might be something as simple as this:
> Thou shalt not kill.
> "Peace is something to be made,
> constructed, hammered out, not an
> ideology. It's very concrete, not a
> theory. It almost needs a hammer, tools.
> The government displayed a nuclear
> weapon nose cone in our courtroom.
> Looking at it was like looking at our
> doomsday, like looking at the end of
> the world."

By comparison with the real, slow-moving, often disheartening moral adventures of quietly courageous people, *Final Countdown* is, of course, trivial. But it's only a game. In my view, it's very preferable to a game in which the player plays to destroy abstract worlds of abstract people, using make-believe verbal and graphics devices not much simpler to unleash-and-destroy-with than the real world-killer weapons that politicians play with.

Final Countdown is as realistic in its way as are the techno-war games it is a counterweight to. There *are* non-game-players who really do these things. For the rest of us.

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16K
ECB

Analysis of Variance— A 'Nova' for CoCo

By Sam Sherrill

Manufacturers may install power into the computer, but it is the programmer who gives it strength. And while many have provided the games (and good ones, too) for our amusement, programmers such as Sam Sherrill have helped extend the basic capabilities of our computer by developing its quantitative nature through programs and tutorials related to statistical analysis, science and education.

The author is on the faculty of the School of Planning at the University of Cincinnati, where he teaches research and statistics courses.

The purpose of analysis of variance (ANOVA) is to reveal differences among samples that are *not* due to chance. The usual procedure is to test the assumption that the samples are alike. Statisticians call this assumption the null hypothesis. They also label differences that seem unlikely to occur by chance as statistically significant differences. Thus, in the language of statistics, ANOVA is used to test the null hypotheses.

If the null hypothesis is supported by the ANOVA results then we may conclude that the populations from which the samples were taken are also alike. For example, we could compare examination scores among classes of students exposed to different teaching methods to test the idea that methods affect learning. The specific classes we select are our samples. The null hypothesis would be accepted as true when no statistically significant differences are found among the exam scores for the classes. This means the variation among the class scores is not explained by variations among the methods we tested. In a more general sense, this result also means that these methods are unlikely to affect exam scores of all other similar students.

If the null hypothesis is contradicted by the ANOVA results then we may conclude that the populations are different. In our example, the null hypothesis that methods have no effect on learning would be rejected since ANOVA revealed statistically significant differences among the class scores. We can conclude that variations among teaching methods do help explain differences among class scores. We can also conclude that these methods would produce differences among other similar students.

ANOVA is an extension of the difference-of-means test (DOM). The DOM test is used to compare two samples to one another. (When just two are compared, an ANOVA and DOM tests lead to the same conclusion.) The DOM test is useful when we have specific hypotheses to test using two particular samples. For example, we would use this test if we expected one teaching method to produce higher scores than another. Using ANOVA on all classes would tell us whether there is a difference among them but would not identify the source of the difference. In general, the ANOVA test is often best suited for exploratory comparisons among three or more groups while the DOM test is more appropriate for specific pair-wise comparisons.

Exploratory comparisons often must be made among samples of unequal size. If the classes in our example were selected from a large population of such classes then it is quite likely that they will not contain the same number of students. ANOVA tests based on arrays (such as the one offered by Bruce Douglass in the December 1982 issue of *80MICRO*) require equal sample sizes. The only way to use this kind of program when sample sizes are not equal is to reduce all of the samples down to the size of the smallest one. However, this also reduces the capacity of the test to reveal differences. In addition, the memory demanded by this kind of program grows as the number of samples or sample sizes grow.

> ***"In general, the ANOVA test is often best suited for exploratory comparisons among three or more groups..."***

To avoid these problems, I wrote an ANOVA program for the Color Computer that does not use arrays. Basically, I took the ANOVA formula for unequal sample sizes apart algebraically and reassembled it in a way that uses running totals instead: thus, any number of samples of either equal or unequal size can be compared. This program requires just over 3K of memory, regardless of the number of sizes of the samples. It will run on machines with 16K and Extended

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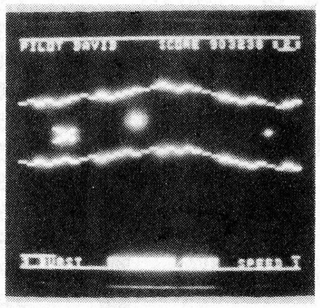

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Color BASIC.

The program calculates the F-Value (the quotient of the variance among samples divided by the variance within samples) and the probability of that value occuring by chance. It then compares this probability to the traditional significance levels of .05, .01, and .001. When the probability is greater than .05, the differences among the samples are labeled as insignificant and the null hypothesis is accepted. When the probability is less than .001, the differences are labeled as significant and the null hypthesis is rejected. Finally, when the probability of a particular value falls between .05 and .001, the program indicates that the differences may or may not be significant and suggests that you may wish to withhold judgment on whether to accept or reject the null hypothesis. By pressing any key, the program then prints the usual results of an ANOVA: the total, among, and within results for the sum of squares and degrees of freedom; estimates of the among and within variances; the F-Value; and, the probability of the F-Value occuring by chance.

```
150  0235
250  04F6
330  08F5
END  0B40
```

The listing:

```
10 CLS
15 PRINT"            ****ONE WAY****
"
20 PRINT"******ANALYSIS OF VARIA
NCE******"
25 PRINT"              WRITTEN BY"
30 PRINT"             SAM SHERRILL"
35 PRINT"           3578 ZUMSTEIN A
VE
40 PRINT"         CINCINNATI, OH 45
208"
45 FOR TM=1 TO 750:NEXT TM:CLS
50 REM **DATA INPUT**
55 PRINT"NUMBER OF SAMPLES":INPU
T SP
60 FOR I=1 TO SP
65 PRINT"NUMBER OF MEASURES FOR
SAMPLE   NUMBER";I:INPUT N:FOR J
N=1 TO N
70 PRINT"MEASURE";JN
75 INPUT A
80 FOR KN=1 TO A
85 REM **DATA ANALYSIS**
90 P=P+A
95 M=M+A^2
100 NEXT JN
105 R=P/N
110 GOSUB 500
115 C=C+P
120 D=D+N
125 V=(M-N*R^2)
130 W=W+V
135 M=0:N=0:R=0:P=0
140 NEXT I
145 CLS
150 ZG=C/D
155 Q=D*ZG^2
160 U=E*ZG
165 B=(H+Q)+U:IF H=Q THEN 170 EL
SE 175
170 PRINT"THERE IS LITTLE OR NO
VARIATION AMONG THE"SP"SAMPLES:
THUS, THE  VALUE OF F IS CLOSE T
O 0.  THE  NULL HYPOTHESIS WHICH
 ASSERTS   THERE ARE NO DIFFEREN
CES AMONG  THE SAMPLES IS ACCEPT
ABLE.":GOTO 410
175 O=B/(SP-1)
180 W1=W/(D-SP):IF W1>0 THEN 190
 ELSE 185
185 PRINT"THERE IS NO WITHIN-SAM
PLE        VARIATION: THUS, THE F
-RATIO     CANNOT BE CALCULATED."
:GOTO 410
190 F=O/W1:IF F<.001 THEN 170 EL
SE 195
195 SS=B+W
200 D1=SP-1:D2=D-SP
205 S=D1
210 T=D2
215 DF=S+T
220 Z=F
225 J=2/9/S
230 K=2/9/T
235 Y=ABS((1-K)*Z^(1/3)-1+J)/SQR
(K*Z^(2/3)+J)
```

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```
240 IF T<4 THEN Y=Y*(1+.08*Y^4/T
^3)ELSE 245
245 X=.5/(1+Y*(.196854+Y*(.11519
4+Y*(.000344+Y*.019527))))^4
250 X=INT(X*10000+.5)/10000
255 X=1-X
260 REM **RESULTS OF DATA ANALYS
IS**
265 PRINT"THE PROBABILITY AN F-V
ALUE OF ";
270 PRINTUSING"######.###";F;
275 PRINT" WOULD OCCUR BY CHANCE
  IS "1-X"."
280 PRINT"THE TRADITIONAL SIGNIF
ICANCE    LEVELS ARE .05, .01, .
001."
285 IF 1-X> .05 THEN 300 ELSE 29
0
290 IF 1-X < .001 THEN 310 ELSE
295
295 IF .05 >=1-X OR 1-X=>.001 TH
EN 315
300 PRINT"BY THESE STANDARDS, TH
E F-VALUE ABOVE IS NOT SIGNIFICA
NT AND    NEITHER ARE THE DIFFER
ENCES     AMONG THE";
305 PRINTUSING"##";SP;:PRINT" SA
MPLES; THUS, THE  NULL HYPOTHESI
S OF NO DIFFERENCEIS ACCEPTABLE.
": GOTO 320
310 PRINT"BY THESE STANDARDS, TH
E F-VALUE ABOVE IS SIGNIFICANT,
AS ARE THEDIFFERENCES AMONG THE"
;:PRINTUSING"##";SP;:PRINT" SAMP
LES;THUS, THE NULL HYPOTHESIS IS
 RE-JECTED.": GOTO 320
315 PRINT"BY THESE STANDARDS, TH
E F-VALUE ABOVE MAY OR MAY NOT B
E SIGNIFI-CANT SINCE THE PROBABI
LITY OF   ITS OCCURENCE FALLS BE
TWEEN .05 AND .001. YOU MAY WISH
 TO WITH- HOLD JUDGMENT REGARDIN
G THE     ACCEPTANCE OR REJECTIO
N OF THE  NULL HYPOTHESIS.
320 PRINT"*PRESS ANY KEY FOR A D
ISPLAY OF THE RESULTS.*"
325 A$=INKEY$: IF A$<>"" GOTO 34
0 ELSE 330
330 GOTO 325
335 REM **RESULTS IN TABULAR FOR
M**
340 CLS
345 PRINTTAB(12)"SUMS OF SQUARES
"
350 PRINT@32,"TOTAL";:PRINTTAB(1
1)"";SS
355 PRINT@64,"AMONG";:PRINTTAB(1
1)"";B
360 PRINT@96,"WITHIN";:PRINTTAB(
11)"";W
365 PRINT@128,;:PRINTTAB(12)"DEG
REES OF FREEDOM"
370 PRINT@160,"TOTAL";:PRINTTAB(
11)"";DF
375 PRINT@192,"AMONG";:PRINTTAB(
11)"";S
380 PRINT@224,"WITHIN";:PRINTTAB
(11)"";T
385 PRINT@256,;:PRINTTAB(12)"EST
IMATE OF VARIANCE"
390 PRINT@288,"AMONG";:PRINTTAB(
11)"";O
395 PRINT@320,"WITHIN";:PRINTTAB
(11)"";W1
400 PRINT@352,"F-RATIO";:PRINTTA
B(11)"";F
405 PRINT@384,"PROB(F)";:PRINTTA
B(11)"";1-X
410 PRINT"*DO YOU WISH TO RUN TH
E PROGRAM AGAIN: Y OR N?*": INPU
T L$: IF L$="Y" THEN 415 ELSE 42
0
415 RUN
420 END
500 G=N*R^2:H=H+G
505 L=-2*N*R
510 E=E+L
515 RETURN
```

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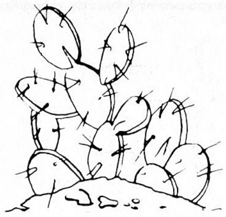

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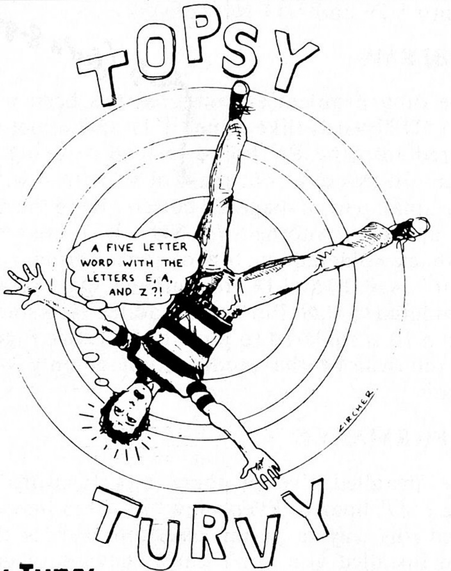
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64K Modification For 'D' Board Both Easy, Inexpensive

By B. H. Alsop

Until now one had to either cut traces or buy a wolfbug 64K adapter card ($150) to convert your 'D' series CoCo board to 64K. Here's how to do it for $2 over the cost of the RAMs. Traces don't have to be cut and the modification can be easily removed.

MODIFICATION

Purchase eight 16 pin dip sockets. Buy the type that will plug into each other. Solder a small gauge wire into each socket pin #9. Bend RAM IC pins 1,8 and 9 upward for all 64K RAMs and insert them into the prepared dip sockets. Solder the wire from socket pin 9 to IC pins 8 and 1. Your completed RAM socket assembly should look like Figure 1. Insert the completed assemblies into your CoCo RAM sockets. Solder all pin 9s together with wire and connect this bus to pin 35 of the 6883 SAM(U10) with a series 33 ohm resistor. Reconfigure the jumper block near the SAM to 16K. Remove the other jumper block. Solder a wire from pin 12 of U4 (6821 PIA) to pin 17 of U8 (96821 PIA).

Now proceed with the F. Hogg modification as described below

1. Remove U29 and U11 from their sockets. Bend pins 4,5 and 6 of U29 up. Bend pin 5 of U11 up.
2. Connect pin 8 to pin 6 of U29. Reinsert both ICs.
3. Connect pin 4 of U29 to pin 5 of U11. Connect a wire from pin 5 of U29 to TP1. Insert version 1.1 BASIC ROM.

Note that no capacitor leads are cut. In fact, the capacitors remain in the circuit to suppress power supply noise.

To remove the modification, unplug the IC assemblies, unsolder a few wires and insert new 74LSO2 and 74LS138 ICs into U29 and U11 respectively.

PROBLEMS

5 (corr'n 8-83)

The only problem encountered has been with very old CoCo "D" boards (like mine). U11 and sometimes U29 are soldered into the PC board instead of being mounted in sockets. In this case, cut pin 4 of U11 flush with the board with a small pair of diagonal cutters. Bend the remaining IC lead upward. Another 74LSO2 is prepared and then piggyback soldered on top of the existing U29. All pins except 7, 8, 9, 10 and 14 are removed. Only pins 7, 8, and 14 are soldered to U29. Pin 9 of this added IC is soldered to TP1 and pin 10 is soldered to pin 5 of U11. See Figure 2. In this case removal of the modification is only slightly more difficult.

PERFORMANCE

I've installed five of these modifications on various vintage "D" boards. Even a few "E" series boards have been altered this way to permit easy removal for their owners. When installed you don't know that you ever had a "D" board CoCo. Good luck.

Figure 1. RAM Assembly

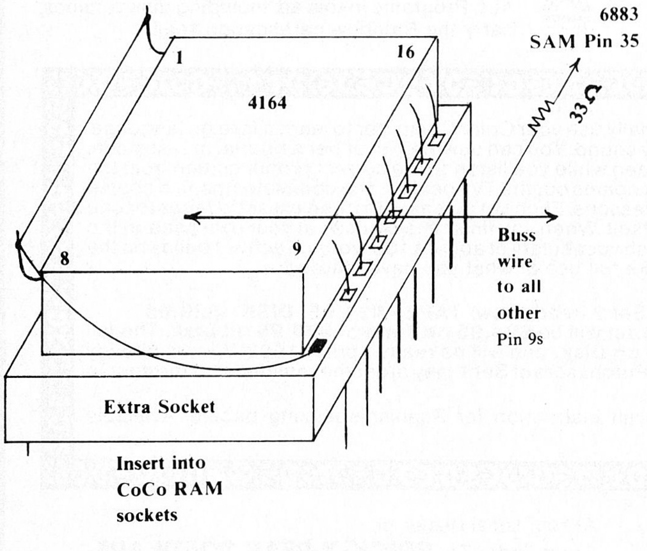
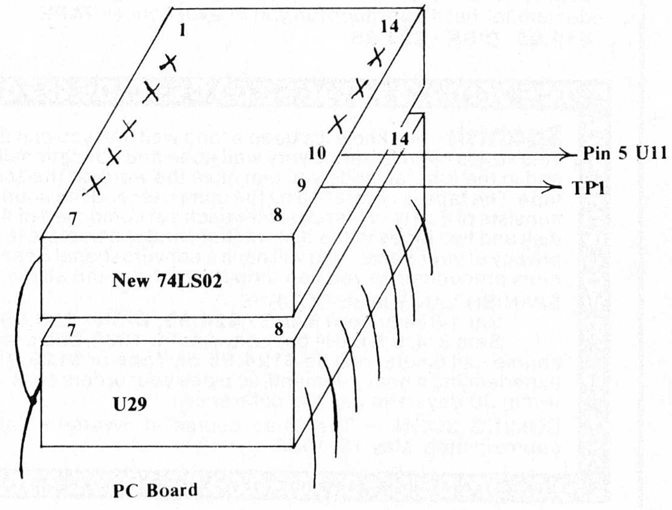


Figure 2. Piggyback



NOTE: Pins 7, 8, and 14 of new 74LS02 soldered to U29
X denotes removed pin

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RAINBOW
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SEAL

Making and Rotating Rectangles

By Don Inman
Rainbow Contributing Editor

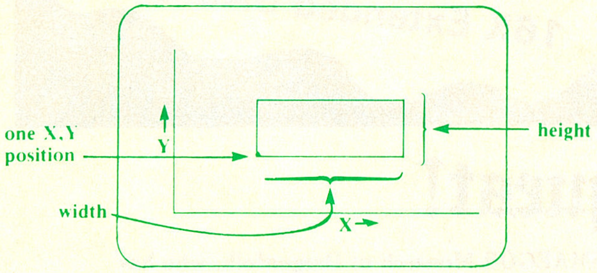
This is the sixth of a series of articles on the graphic capabilities of Extended Color Basic on the TRS-80 Color Computer. It goes beyond the material that was covered in the book *TRS-80 Color Computer Graphics.*

Last month, we looked at a way to modify the output to the video screen so that the display would conform to the first quadrant of the Cartesian coordinate system. A method was shown to scale the Y coordinate so that X and Y units would appear to be the same length on the screen.

This article will continue using those techniques but will restrict itself to a specific shape, the rectangle. We will develop a very general program to define the rectangle in as simple a way as possible. At the same time, provision will be made to maintain flexibility when positioning the rectangle on the screen.

PARALLEL RECTANGLES

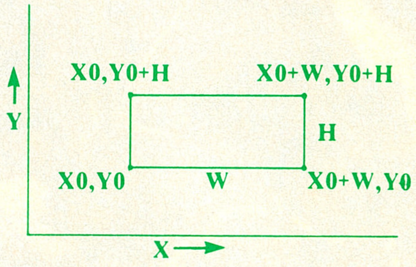
A rectangle can be defined by two characteristics, its height and its width. In developing the first stage of our program let's limit the rectangle to one whose sides are parallel to the X, Y axes. We can remove that restriction after the basic program has been developed. If the length and width of the rectangle are known, the X,Y coordinates of one vertex (corner) determine where the rectangle appears on the screen.



One input, the X, Y corner position, can be used to move the rectangle left or right and up or down (called a translation). Four pieces of information completely define the placement of the rectangle. The following variables are used:

X0 = X coordinate of one corner position
Y0 = Y coordinate of same corner
H = height of rectangle
W = width of rectangle

The length and width parameters can be used in the program to calculate the end-points of lines that make up the rectangle in the following way.



The following subroutine will define the corners of the rectangle. The lower left corner is PSET by DRAWSUB1, and the four lines are drawn by DRAWSUB2. Subroutines are used so that you may use them with any main program.

```
2000 REM *** DEFRECTSUB ***
2010 REM REQUIRES X0,Y0 THE COOR
DINATES
2020 REM   OF ONE CORNER AND USE
S
2030 REM   DRAWSUB1 AND DRAWSUB2
2040 GOSUB 3030   'DRAW AXES
2050 X1=X0:Y1=Y0:X2=X0+W:Y2=Y1
2060 GOSUB 3540   'DRAW LINE
2070 Y2=Y0-.8*H
2080 GOSUB 3540
2090 X2=X0
2100 GOSUB 3540
2110 Y2=Y0
2120 GOSUB 3540
2130 RETURN
2140 '
3000 REM *** DRAWSUB1 ***
3010 REM SETS LOWER LEFT CORNER
3020 REM   OF RECTANGLE
3030 Y0=181-.8*Y0: PSET(X0,Y0)
3040 RETURN
3050 '
3500 REM *** DRAWSUB2 ***
3510 REM DRAWS LINE FROM X1,Y1
3520 REM   TO X2,Y2 AND SETS
3530 REM   X1 TO X2 AND Y1 TO Y2
3540 LINE(X1,Y1)-(X2,Y2),PSET
3550 X1=X2: Y1=Y2
3560 RETURN
```

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The main program consists of input data (lines 100-140), the graphic screen setup (lines 210-230 and line 260), drawing the axes (lines 240-250), a call to the subroutine (line 270), and an INKEY$ instruction (line 290) where the computer holds the screen until you press a key. Pressing a key returns you to the beginning for more inputs.

```
x x 100 REM *** INPUT DATA ***
110 CLS
120 INPUT "HEIGHT";H
130 INPUT "WIDTH";W
140 INPUT "X,Y";X0,Y0
150 '
200 REM *** SET SCREEN; DRAW AXE
S ***
210 PMODE 4,1
220 PCLS1
230 COLOR 0,1
240 LINE(0,181)-(255,181),PSET
250 LINE(0,0)-(0,181),PSET
260 SCREEN 1,0
270 GOSUB 2040
290 IF INKEY$="" THEN 290 ELSE 1
10
300 '
```

It should be noted that a correction was made for the screen distortion (Y divided by X) in lines 2070 and 3030. This was discussed in last month's article. The main program is similar to that used last month.

TM

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ColorZAP

Use Color Power.

ColorZAP uses the power of the Color Computer to provide both rapid scanning and full screen modification capabilities.

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- Copy sectors to same or different drive.
- Use color power to scan disk data.

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About the program: "ColorZAP is a powerful program that allows you to see what is on the disk, modify it and, if possible, recreate it. Menu-driven, ColorZAP is extremely easy to use and well-documented...A good offering." — The RAINBOW, September 1982

About the manual: "A 24-page manual is included that describes program operation in detail. It also provides valuable information on the important disk system parameters." — MICRO, December 1982

For the TRS-80 Color Computer. Available on disk with an accompanying manual from Software Options, 19 Rector Street, New York, N.Y. 10006. 212-785-8285. Toll-free order line: 800-221-1624. Price: $49.95 (plus $2.00 per order shipping and handling). New York State residents add sales tax. Visa/Mastercard accepted.

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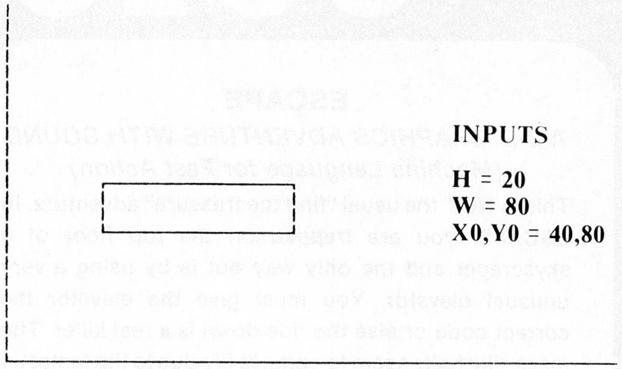
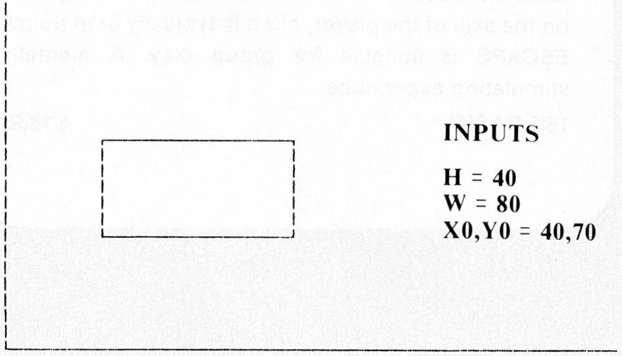
TYPICAL PARALLEL RECTANGLES



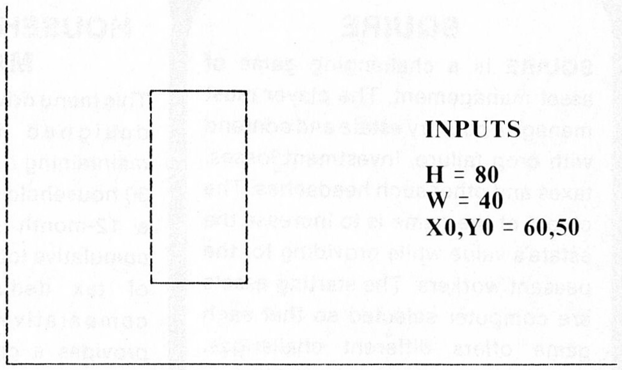
INPUTS

H = 20
W = 80
X0,Y0 = 40,80



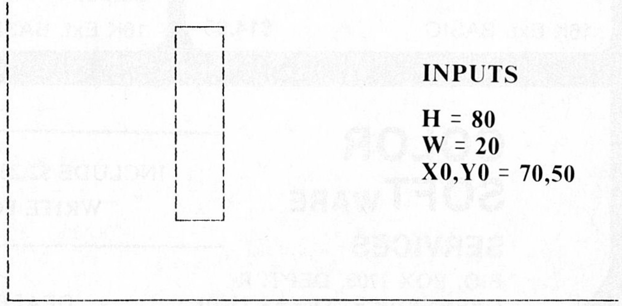
INPUTS

H = 40
W = 80
X0,Y0 = 40,70



INPUTS

H = 80
W = 40
X0,Y0 = 60,50



INPUTS

H = 80
W = 20
X0,Y0 = 70,50

Sugar Software

SEE YOU AT RAINBOWFEST!

AUTO RUN

Auto Run is a utility program for the TRS-80* Extended Basic Color Computer. It is used to add convenience and professionalism to your software.

Auto Run will help you create your title screen with the graphics editor. The graphics editor allows you to choose a background color and border style. Using the arrow keys and several other commands you can draw pictures, block letters and also include text.

Auto Run will generate a machine language loader program to preceed your program on the tape. Then, to start up your program, simply type CLOADM to load in the Auto Run loader program, which will then automatically start itself up, display your title screen, load your program and then RUN or EXEC it.

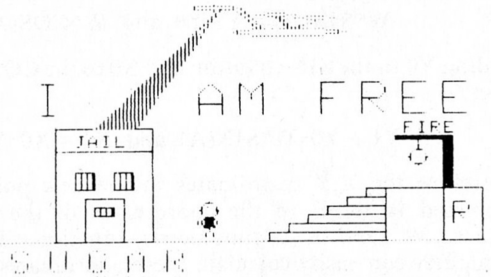
Also you may record a vocal or musical introduction preceding your program. The Auto Run loader will control the audio on/off.

Basic programs can be set to load anywhere in memory above $600 (the PCLEAR 0 page).

Software authors: The Auto Run prefix may be appended to your software products.

Auto Run is **$14.95** and includes complete documentation and an assembly source listing. Requires 16K Extended Basic.

Galactic Hangman



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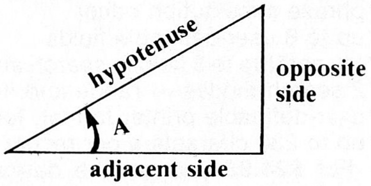
INPUTS

H = 80
W = 80
X0,Y0 = 40,50

ROTATING RECTANGLES

You may want to place a rectangle on the screen in a position that is not parallel to the axes of the coordinate system. A basic knowledge of trigonometry is helpful at this point. In this discussion and the modifications to our original program that will follow it, the sine and cosine trig functions are used. These functions are merely ratios of certain sides of a right triangle in relationship to a given angle of the triangle.



SIN(A) = opp. side/hypotenuse

COS(A) = adj. side/hypotenuse

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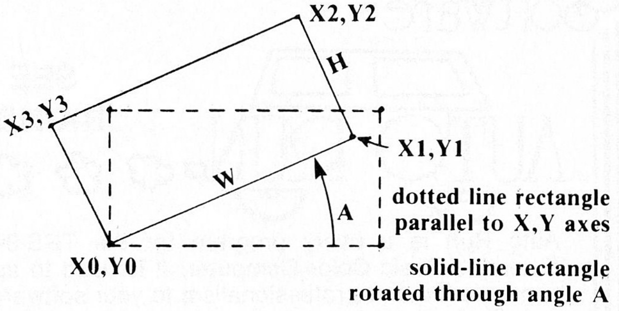
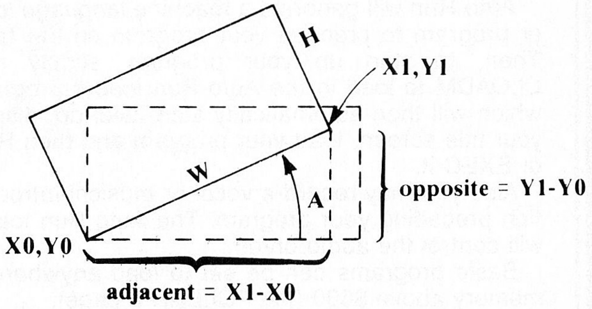
Suppose we start with a rectangle that is parallel to the X,Y axes and rotate the rectangle about the lower left corner by an angle A.


X2,Y2
H
X3,Y3
X1,Y1
W
A
dotted line rectangle parallel to X,Y axes
X0,Y0
solid-line rectangle rotated through angle A

The lower left coordinates are the same as before, but the coordinates of the other corners have changed.

First, consider the point X1,Y1.



The sine and cosine relationships become:

SIN(A) = opp./hyp. = Y1-Y0/W

COS(A) = adj./hyp. = X1-X0/W

Multiplying both sides of each equation by W gives:

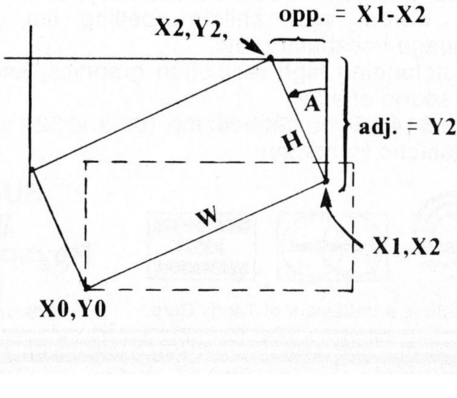
W*SIN(A) = Y1-Y0 and W*COS(A) = X1-X0

Adding Y0 to the SIN equation and X0 to the COS equation gives:

* Y1 = Y0+W*SIN(A) and X1 = X0+W*COS(A)

Therefore the X,Y coordinates of the new point can be expressed in terms of the coordinates of the lower left corner, W, and a trigonometric function. The Color Computer can easily calculate these coordinates.

Now consider the next new corner (X2,Y2).



First,

SIN(A) = X1-X2/H COS(A) = Y2-Y1/H Then,

H*SIN(A) = X1-X2 and H*COS(A) = Y2-Y1

And finally,
* X2 = X1-H*SIN(A) and Y2 = Y1+H*COS(A)

In a similar way, it can be shown that:
* X3 = X2-W*COS(A) and Y3 = Y2-W*SIN(A)

By changing only four lines of DEFRECTSUB in our previous program, we can arrive at a program that will place the rectangle at any angle and at any location on the screen. Change lines:

```
2050 X1=X0: Y1=Y0: X2=X0+W*COS(A): Y2=Y0-
8*W*SIN(A)
2070 X2=X1-H*SIN(A): Y2=Y1-.8*H*COS(A)
2090 X2=X1-W*COS(A): Y2=Y1+.8*W*SIN(A)
2110 X2=X0:Y2=Y0
```

Two lines are also added to the main program to input the angle of rotation in degrees and to convert the angle to radians. The SIN and COS functions in Color Basic and Extended Color Basic require angular units to be radians rather than degrees. If you wish, you may input the angles directly in radians at line 150 and omit line 160.

Add lines:

```
150 INPUT "ANGLE IN DEGREES";A
160 A = A/57.295779
```

The revised program follows. Use care in the placement and size of the rectangles that you draw. There are no provisions in the program that will insure that all points will be within the limits of the display. This is left as an exercise for you.

300 012D
END 039D

```
100 REM *** INPUT DATA ***
110 CLS
120 INPUT "HEIGHT";H
130 INPUT "WIDTH";W                added
140 INPUT "X,Y";X0,Y0
150 INPUT "ANGLE IN DEGREES";A
160 A = A/57.295779
170 '
200 REM *** SET SCREEN; DRAW AXE
S ***
210 PMODE 4,1
220 PCLS1
230 COLOR 0,1
240 LINE(0,181)-(255,181),PSET
250 LINE(0,0)-(0,181),PSET
260 SCREEN 1,0
270 GOSUB 2040
290 IF INKEY$="" THEN 290 ELSE 1
10
300 '
2000 REM *** DEFRECTSUB ***
2010 REM REQUIRES X0,Y0 THE COOR
DINATES
```

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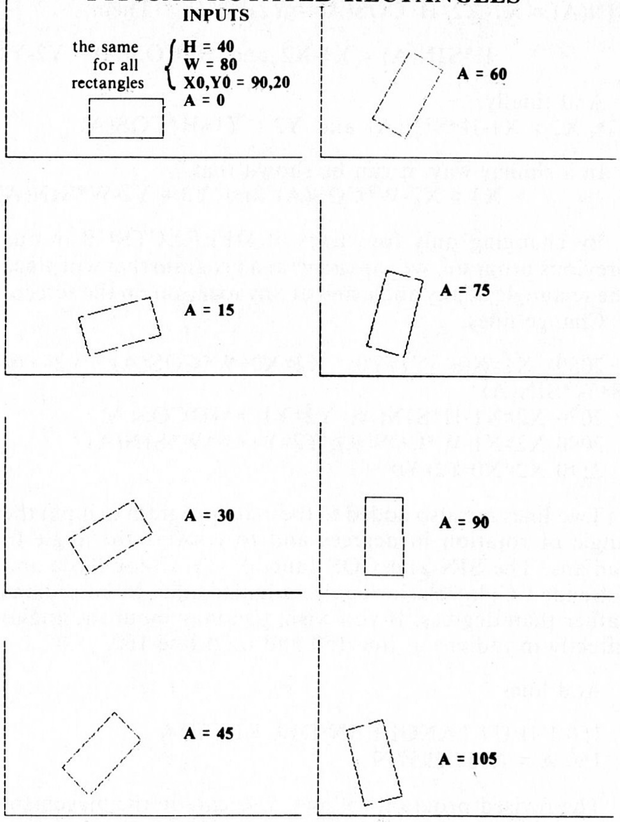
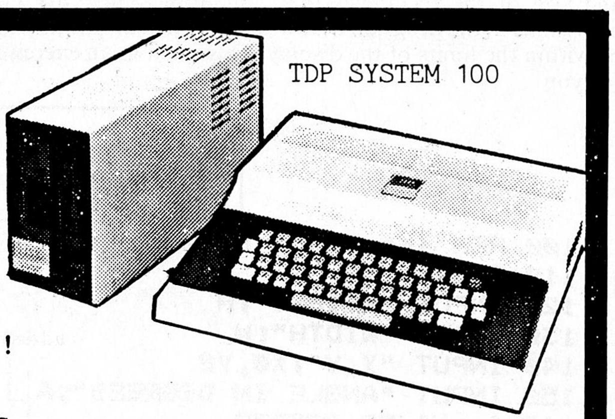
```
2020 REM   OF ONE CORNER AND USE
S
2030 REM   DRAWSUB1 AND DRAWSUB2
2040 GOSUB 3030  'DRAW AXES
2050 X1=X0:Y1=Y0:X2=X0+W*COS(A):
Y2=Y0-.8*W*SIN(A)
2060 GOSUB 3540  'DRAW LINE
2070 X2=X1-H*SIN(A): Y2=Y1-.8*H*
COS(A)
2080 GOSUB 3540
2090 X2=X1-W*COS(A): Y2=Y1+.8*W*
SIN(A)
2100 GOSUB 3540
2110 X2=X0: Y2=Y0
2120 GOSUB 3540
2130 RETURN
2140 '
3000 REM *** DRAWSUB1 ***
3010 REM SETS LOWER LEFT CORNER
3020 REM   OF RECTANGLE
3030 Y0=181-.8*Y0: PSET(X0,Y0)
3040 RETURN
3050 '
3500 REM *** DRAWSUB2 ***
3510 REM DRAWS LINE FROM X1,Y1
3520 REM   TO X2,Y2 AND SETS
3530 REM   X1 TO X2 AND Y1 TO Y2
3540 LINE(X1,Y1)-(X2,Y2),PSET
3550 X1=X2: Y1=Y2
3560 RETURN
```

changed

TYPICAL ROTATED RECTANGLES

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LISTING FOR PARALLEL RECTANGLE

```
290  00F7
END  0327
```

```
100 REM *** INPUT DATA ***
110 CLS
120 INPUT "HEIGHT";H
130 INPUT "WIDTH";W
140 INPUT "X,Y";X0,Y0
150 '
200 REM *** SET SCREEN; DRAW AXE
S ***
210 PMODE 4,1
220 PCLS1
230 COLOR 0,1
240 LINE(0,181)-(255,181),PSET
250 LINE(0,0)-(0,181),PSET
260 SCREEN 1,0
270 GOSUB 2040
290 IF INKEY$="" THEN 290 ELSE 1
10
300 '
2000 REM *** DEFRECTSUB ***
2010 REM REQUIRES X0,Y0 THE COOR
DINATES
2020 REM    OF ONE CORNER AND USE
S
2030 REM    DRAWSUB1 AND DRAWSUB2
2040 GOSUB 3030   'DRAW AXES
2050 X1=X0:Y1=Y0:X2=X0+W:Y2=Y1
2060 GOSUB 3540   'DRAW LINE
2070 Y2=Y0-.8*H
2080 GOSUB 3540
2090 X2=X0
2100 GOSUB 3540
2110 Y2=Y0
2120 GOSUB 3540
2130 RETURN
2140 '
3000 REM *** DRAWSUB1 ***
3010 REM SETS LOWER LEFT CORNER
3020 REM    OF RECTANGLE
3030 Y0=181-.8*Y0: PSET(X0,Y0)
3040 RETURN
3050 '
3500 REM *** DRAWSUB2 ***
3510 REM DRAWS LINE FROM X1,Y1
3520 REM    TO X2,Y2 AND SETS
3530 REM    X1 TO X2 AND Y1 TO Y2
3540 LINE(X1,Y1)-(X2,Y2),PSET
3550 X1=X2: Y1=Y2
3560 RETURN
```

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A Disjointed Tale For Assorted Wags

By T. & R. Delbourgo

Remember that old party game some of us called "Consequences?" Each of a number (greater than two) of people, seated round a table is provided with a slip of paper on which s/he must write a short story; for example:

(1) Napoleon met (2) Josephine on (3) the Isle of Elba.
(4) It was a desolate scene.
(5) He said: It is lonely here.
(6) She said: Don't despair!
(7) The consequence was: He returned to the mainland.
(8) The moral is: Never say die.

However, the whole point of the game is that at every stage of the story the papers are passed round the table. The result can be a hilarious jumble of stories with the oddest characters and consequences!

Your CoCo can add to the fun of the proceedings by offering a whole new series of permutations that are just not possible in the pencil and paper version. To give a little spice, the computer can assign a color code to every player (up to eight) and throw in some sound effects for good measure. The following program is self-explanatory and we think it can be used to liven up a party when spirits are starting to flag.

Type in the listing below exactly as it appears (spaces, etc.) to achieve a perfect layout. In Line 16, as each tale is presented, you have the option of being able to print out any story which has particular appeal. Even though we have reserved 4500 characters in string space (Line 4), try to keep your sentences fairly short, say one line at most.

the
Naked Gamer

If you think strip poker sounds like fun, read on. Actually, the name of this program package is not completely accurate. Only one player will end up completely undressed. These games are for the adventurous couple!!

The two games are good by themselves, but in the right company they can be terrific. The first is called **Strip Tails,** and is an arcade game played by two players simultaniously. You will need quick hands on the joystick and a quick grasp of the tactics to win, and if you lose, you could really lose your shirt. The other game is called **Sex,** and is something like Mastermind™. Both the player and the computer choose a three letter word, and the player has to guess the computer's word before the computer can guess the player's.

At the end of each round of either game, the computer will instruct one of the players, by name, to remove a specific item of their clothing. Don't worry, there isn't anything obscene in these programs. (Remember, you are choosing a THREE letter word.) On the other hand, the RESULTS from playing could be interesting indeed, and the games are really good even if you elect to keep your clothes on. Available on **TAPE** for **$21.95,** or on **DISK** for **$26.95.** You will like these!!!

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Intelligent Adult Software

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The Listing:

```
1 POKE359,13:SCREEN0,1
2 CLS0:POKE65495,0:FORH=1024TO15
35:POKEH,63:NEXTH:POKE65494,0:PR
INT@234,"CONSEQUENCES!";
3 PRINT@453,"BY T. AND R. DELBOU
RGO";:PLAY"O3L10CCL5EL10EEL5GL10
GGL5O4CP1"
4 CLEAR4500:CLS0:INPUT"enter THE
 NUMBER OF PLAYERS       (MAXIMUM
OF 8)";N
5 DIMS$(N,8)
6 FORP=1TON:GOSUB35:NEXTP
7 CLS0:PRINT"IF YOU ARE READY NO
W, I WILL      MIX UP THE STORIES
AND THEIR      CONSEQUENCES."
8 PRINT(N-1)"DIFFERENT MIXED-UP
SETS OF"N"STORIES FOLLOW:":PRINT
@448,"PRESS ANY KEY TO CONTINUE"
9 I$=INKEY$:IFI$=""THEN9
10 FORU=0 TO N-2:FORP=1TON:CLS0
11 R=P-N*INT((P-1)/N):L=P+1+U-N*
INT((P+U)/N):PRINT@0,CHR$(127+16
*R)+S$(R,1)+" MET "+CHR$(127+16*
L)+S$(L,2):SOUND89,3:SOUND108,3
12 FORQ=3TO4:L=Q+P+(Q-1)*U-1-N*I
NT((Q+P+Q*U-U-2)/N):PRINTCHR$(12
7+L*16)+S$(L,Q):SOUND101+8*Q,3:N
EXTQ:PRINT
13 K=P+4+4*U-N*INT((P+3+4*U)/N):
PRINTCHR$(K*16+127)+"HE SAID: "+
S$(K,5):SOUND147,3
14 K=P+5+5*U-N*INT((P+4+5*U)/N):
PRINTCHR$(16*K+127)+"SHE SAID: "
+S$(K,6):PRINT:SOUND159,3
15 FORQ=7TO8:L=Q+P+(Q-1)*U-1-N*I
NT((Q+P+Q*U-U-2)/N):PRINTCHR$(12
7+L*16)+S$(L,Q):SOUND128+6*Q,3:N
EXTQ
16 PRINT@448,"PRESS ANY KEY TO C
```

RAINBOWfest
april 22-24, 1983

CoCo's Very First Show!

CoCo has grown up and it's time for CoCo's very first show. Sponsored by *the Rainbow*, the premier magazine for the TRS-80 Color, TDP System-100 and Dragon-32 computers, RAINBOWfest will be *the* place to be this Spring.

Exhibits will abound. Information will flow. New products will be shown and introduced. Many of the "names" in the CoCo world will be in attendance. It all boils down to three days of fun, excitement and learning for everyone lucky enough to own a CoCo (or those who just wish they did)!

The place is the Regency-Hyatt Woodfield, located on the western outskirts of Greater Chicagoland, within easy access to highways and O'Hare International Airport.

The dates are April 22-24.

The times are 7-10 p.m. Friday; 9 a.m.—8 p.m. Saturday; and 10 a.m.—5 p.m. Sunday at the Grand Ballroom.

The cost is only $7.50 for a three-day ticket in advance or $11 for a three-day ticket at the door. One-day tickets are $5. in advance or $7.50 at the door.

A Saturday "let's make friends" breakfast is also planned. Cost of $10 includes breakfast and a speaker—someone well known in the world of Color Computers.

Rooms are available at the Regency-Hyatt Woodfield for a special RAINBOWfest rate of $43 per night, single or double occupancy.

Admission tickets, breakfast tickets and reservation cards for the hotel can be secured directly from *the Rainbow*. Mail the form below to *the Rainbow*, P.O. Box 209, Prospect, KY 40059. Advance sale tickets will be sent by return mail up until April 15. After that, they will be available at the door.

Oh yes...for the "others" who (perish the thought) don't get into CoCo like you do, Woodfield Shopping Center directly adjacent to RAINBOWfest is the world's largest enclosed shopping mall. And, you are only a short drive from downtown Chicago's museums, theatres, aquarium and shops.

RAINBOWfest has it all! Don't miss CoCo's very first show!

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RAINBOWfest
april 22-24,1983

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handling charge $1.00

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- Also send me a reservation card for the Hyatt-Regency Woodfield.

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GRAPHICS PROGRAM GENERATOR II........................ $16.95
All the features of GPG I plus **characters** with a self loading machine language module! Includes a binary screen save feature to reproduce your graphics with text in a later program. Manual includes Assembly Language source listing.

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Utilize your CoCo to reduce your electric bill! Both text and graphic presentations are used to show consumption in either dollars or KWH. Extra features include bill projection anytime during month and 20 day trend analysis. If you can't measure it, you can't manage it! Sixteen page manual includes listing and forms to record data. Printer is NOT required.

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```
ONTINUE":PRINT@488,"PRESS P TO P
RINT";
17 I$=INKEY$:IFI$=""THEN17
18 IFI$="P"THENGOSUB45
19 NEXTP,U
20 CLS0:PRINT"DO YOU WANT TO SEE
 THE ORIGINAL STORIES? (Y/N)"
21 I$=INKEY$:IFI$=""THEN21
22 IFI$="Y"THENGOTO25
23 IFI$="N"THENGOTO30
24 GOTO21
25 FORP=1TON:CLS(P):PRINT"PLAYER
"P"'S STORY:-":PRINT
26 PRINTS$(P,1)+" MET "+S$(P,2):
PRINTS$(P,3):PRINTS$(P,4):PRINT
27 PRINT"HE SAID:  "+S$(P,5):PRIN
T"SHE SAID:  "+S$(P,6):PRINT
28 PRINTS$(P,7):PRINTS$(P,8):SOU
NDP*30,10:FORJ=1TO4000:NEXTJ
29 NEXTP
30 CLS0:PRINT@228,"MORE CONSEQUE
NCES? (Y/N)";
31 A$=INKEY$:IFA$=""THEN31
32 IFA$="Y"THENRUN
33 IFA$="N"THEN CLS0:PRINT@224,"
THE END.....";:END
34 GOTO31
35 CLS(P):PRINT"PLAYER"P
36 LINEINPUT"enter NAME OF MALE
CHARACTER :   ";S$(P,1)
37 PRINT:LINEINPUT"enter NAME OF
 FEMALE CHARACTER :";S$(P,2)
38 PRINT:LINEINPUT"WHERE DID THE
Y MEET ?           ";S$(P,3)
39 PRINT:LINEINPUT"DESCRIBE THE
SCENE :            ";S$(P,4)
40 PRINT:LINEINPUT"WHAT DID HE S
AY ?               ";S$(P,5)
41 PRINT:LINEINPUT"WHAT DID SHE
SAY ?              ";S$(P,6)
42 PRINT:LINEINPUT"WHAT WAS THE
CONSEQUENCE ?      ";S$(P,7)
43 PRINT:LINEINPUT"WHAT IS THE M
ORAL OF THE STORY ?";S$(P,8)
44 RETURN
45 PRINT#-2:PRINT#-2,S$(P-N*INT(
(P-1)/N),1)+" MET "+S$(P+1+U-N*I
NT((P+U)/N),2)
46 FORQ=3TO4:L=Q+P+(Q-1)*U-1-N*I
NT((Q+P+Q*U-U-2)/N):PRINT#-2,S$(
L,Q):NEXTQ
47 PRINT#-2,"HE SAID:  "+S$(P+4+4
*U-N*INT((P+3+4*U)/N),5)
48 PRINT#-2,"SHE SAID:  "+S$(P+5+
5*U-N*INT((P+4+5*U)/N),6)
49 FORQ=7TO8:L=Q+P+(Q-1)*U-1-N*I
NT((Q+P+Q*U-U-2)/N):PRINT#-2,S$(
L,Q):NEXTQ
50 PRINT#-2:RETURN
```

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Known as the Program Stacker, UP-1 allows several programs to be loaded until the memory is filled. Quickly jump from one program to another or compose new programs while retaining the old ones. Programs are included for patching damaged programs. Allows data or machine language programs to be stored and retrieved from a cassette. Programs are included for writing values or characters to memory and displaying memory contents. Blocks of memory can be relocated. UP-1 can be used as a Word Processor by allowing text to be stored in memory and printed on the screen or an external printer. UP-1 Cassette $14.95

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Using English mnemonics and Decimal Locations, DISASM is an easy way to learn to assemble machine language programs or subroutines. Subroutines can be used with Basic programs and can be called by either USR or EXEC commands. For CC compatability, all locations are given in decimal values, eliminating the confusion associated with using HEX. All commands are menu oriented and the user provides the particulars for the commands without having to remember command formats. The Disassembler can be used to analyze machine language programs as well as the Basic and Extended Basic CC ROMs. Example programs are included. Cassette $19.95

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Software Review...

CoCo-Jot
A Thinking Person's Hangman

Computer Island has come up with an interesting version of the spelling game "Hangman." It's called *CoCo-Jot*. Can you figure out the hidden word (either three, four, or five letters—your choice) within 10 tries? You start with 100 points and lose 10 for each try down to your 10th try and zero points.

Since Computer Island is aiming at educational software I wanted to try *CoCo-Jot* with my children, not only as a teacher in a classroom setting, but as a parent might use this program at home.

The well-done introduction of *CoCo-Jot* builds excitement. However, the game is not as exciting. *CoCo-Jot* requires an understanding that would take a teacher several rounds to explain. The directions are too complicated for young students alone to figure out. My children (first, fourth and sixth grade students) were able to handle it on their own after some coaching by me. My fourth grader finally said, "Oh! It's like Hangman."

The game lets you type a word and then tells you how many letters you got right. An alphabet list then lets you eliminate letters you feel you do not need. Then you switch to a "scratch pad" where you can play with the letters and try various combinations. My children, on their own, turned off the volume control as they did not like the constant "beep" of the scratch pad. By a process of elimination, you keep on guessing words until either you get it right or you get to the 10th try and the computer tells you the hidden word.

My first grader constantly referred to the word list looking for words that had, or did not have, the proper letters. This process will provide her with letter and word recognition. But it requires one-on-one help with a great deal of patience. She exclaimed "Thank goodness!" (positive) when she got two letters correct on a three letter word. She finally did get the word correct and she played two more games on her own.

My fourth and sixth graders felt that the game was difficult, but both said that they liked it and wanted to continue playing.

There are some changes that I feel would help the game. First, the lead instructions include a question for how much "time" you want. This is misleading as the game is not timed. The question is to randomize the word list. It would be better to have said "pick a number from 001 to 9999." Second, I found the sound in the "scratch area" annoying. It should be eliminated, I feel. Also, my first grader, when looking at the screen for choosing the word, counted five periods (.....?) for a three letter word and was confused.

From my point of view, as a teacher and parent, I feel that *CoCo-Jot* has potential to develop word and letter recognition with students. The game comes with a word list (but must be printed larger for school use). A fine feature is that the program can be modified with your own words and therefore can be tailored to your needs. The game might be more interesting if it were programmed in specific subject areas (i.e., presidents, countries, math terms). Above all, the game requires the most coveted of all educational goals—patience and thought, and to have an adult sit down and develop a working relationship with their student or child. Well, have you spelled "hug" with your child today?

(Computer Island, Dept. R., 227 Hampton Green, Staten Island, NY 10312, $11.95, 16K)

—Michael F. Garozzo

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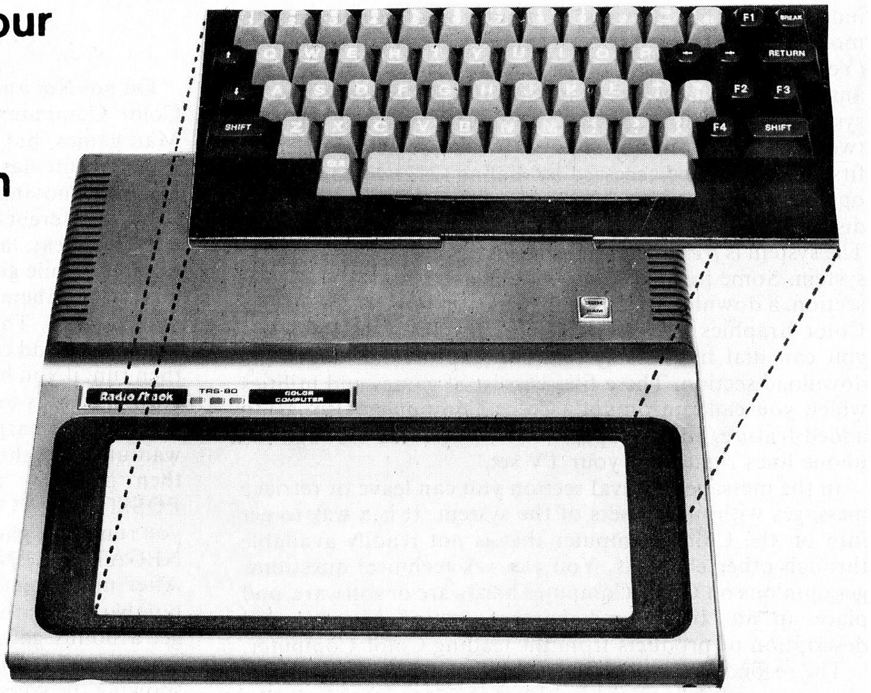

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RETURN
F2
F3
SHIFT
F4
SHIFT
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Now that you know more about the hardware and software which is involved, you may ask, what else can I access besides large data bases which charge for the use of their systems? The answer is a growing phenomenon called the Bulletin Board Service. These are mushrooming all over the United States. What is a Bulletin Board Service you ask? A Bulletin Board Service, or BBS for short, consists of an individual with a personal computer and an auto-answer modem set up to have outside callers access their computer. (Yes, your own mini CompuServe!) Aside from the auto answer modem, one needs special BBS Software to run the system. For example, Spectrum Projects owns and operates two BBS's which totally support the Color Computer. The first system can be accessed by dialing (212) 441-3755. It is operated and run on a Model III with four double-headed disk drives. It has a disk storage capacity of 2.6 megabytes. The system is *free* and *no passwords* are needed to access the system. Some features of the system are a message retrieval section, a downloading section, a merchandise section and a Color Graphics section. Using a Smart Terminal Program, you can dial into the system and capture files from the download section. These files consist of games and utilities which you can run on your Color Computer. Also, as an added feature, color graphics can be accessed through the phone lines right onto your TV set.

In the message retrieval section you can leave or retrieve messages with other users of the system. It is a way to get info on the Color Computer that is not readily available through other channels. You can ask technical questions, get opinions on Color Computer hardware or software, and place an ad. In the merchandise section is a list and description of products from the leading Color Computer.

The second BBS which is operated by Spectrum Projects can be accessed by dialing (212) 441-3766. It will also be accessed if you call BBS#1 and it is being used. It is switched over from BBS#1 to BBS#2 via ringover. The second Bulletin Board is operated on a Color Computer.

There is one last thing you can do with your modem. Become a CoCo sysop! Sysop stands for system operator. The minimum requirements to run a BBS on a Color Computer are 64K of RAM, two disk drives, and an auto answer modem. And of course, BBS software!

Bulletin boards have proven to be very profitable investments, as yours truly can attest to. Just imagine sitting in front of your CoCo BBS and watching it being accessed by a complete stranger at any time of day or night from anywhere in the world! Make way for the Bulletin Board System—the wave of the future!

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Software Review...

Ghostmania Puts *You* In This Fascinating Game

On no! Not another Pac-Man game. It sure seems that the Color Computer has been bombarded with enough Pac-Man games, but this is one of the more original ones.

This game has you in the game itself, not looking down, but in it, moving through walled corridors. *Ghostmania* is slightly different from the arcade version. First, there are no pellets to eat, and instead of energizers there are blue squares. While going through the maze the ghosts (there are about 30 of them) do not move until they see you, then they move at you. They gain points, which are displayed in the upper left hand corner, as they move, up to 255 points. You then run, if you have the chance, to a place where one of the blue squares is under you. The computer then displays how many more charges the pill has left, one to three. There you wait until the ghost rounds a corner and runs into you. You then get how many points he accumulated and one POSITIVE ENCOUNTER. The ghost is then eliminated. If you run into a ghost without being on a blue square you get a NEGATIVE ENCOUNTER, and the ghost disappears. After nine negative encounters the game ends. After a set number of positive encounters, determined by the level, you get a bonus game. The game has the fortunate option of stopping the action and looking down upon the maze, showing the ghosts, blue squares, you and the direction you are facing.

The game can be played for practice without ghosts or have the computer play. There are three skill levels, Beginner, Intermediate, and Competition. There are 10 speed options.

The maze is player designed. There is an 11-digit number displayed at the bottom before the game. The digits determine where passageways start and end and where turns go. For example, 99999999999 would be the easiest maze while 33333333333 would be the hardest. Three is recommended by the manual, as you would most likely be confined in a small area and unable to get to some places.

The graphics I must say are the best I have seen in a game of this sort. Fast machine code produces blue sky, green hallways, an orange floor and very believable white ghosts with blue eyes in a real-time environment. (For any of you *Chromasette* subscribers out there who have the game *Amazing*, the graphics are similar.) The program is written in machine language, and, as such, is very fast. If you buy the program, buy it for the graphics.

The game even has a monthly publication called the *Challenge List* of high scores and competition events. You receive a six-month subscription free when you mail in your registration form.

The 11-page manual is very good. It goes over every detail of the game. No joysticks are required for this game and only 16K. According to the manual, the disk version requires 32K and two disk drives. A game that requires two disk drives must really be something! The cassette version is well worth the price.

(Educational Arcade Systems, 5350 So. 3600W., Salt Lake City, UT 84118, $29.95 for cassette)

—Jeff White

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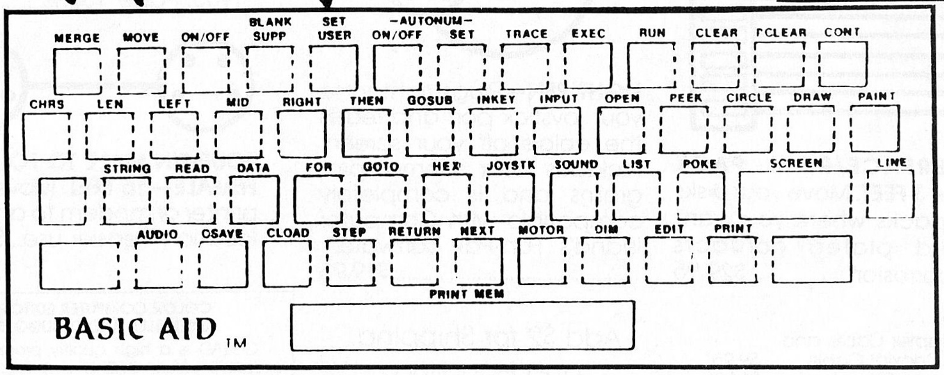
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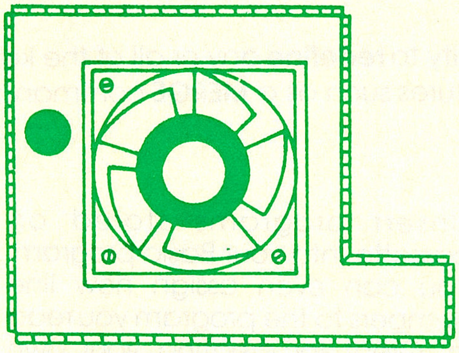

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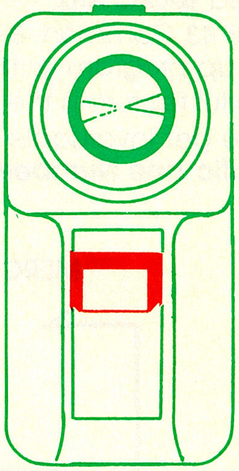

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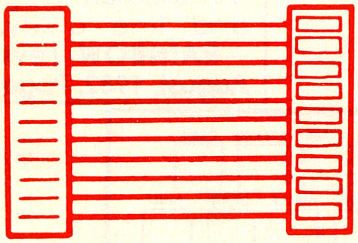

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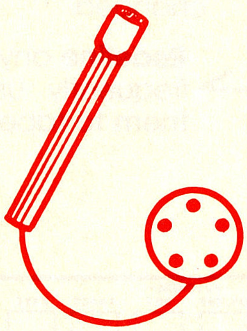

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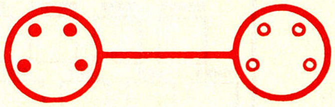

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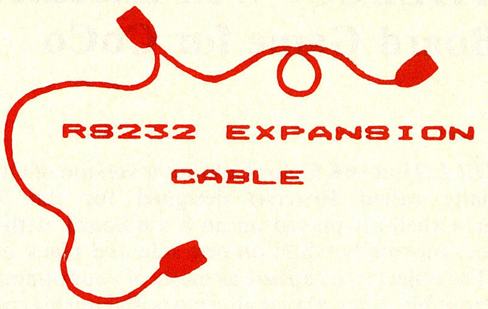

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CCTHELLO: Well-Executed Board Game for CoCo

CCTHELLO is a 16K Color Computer version of Othello (traditionally called Reversi) designed for the Color Computer. Othello is played on an 8 x 8 board, with two-color pieces (normally white on one side and black on the reverse). The object is to capture as many of your opponent's pieces as possible. Each player alternates placing his colored piece on the board in an attempt to outflank the other player. When a single piece or group of pieces have been outflanked, they are flipped to the opposite color. This results in some dramatic changes as the game progresses. Othello offers a range of strategic planning as well as immediate tactical conflict.

The game, marketed by Spectral Associates, is well designed for the Color Computer's graphic capabilities. It should appeal to the beginning and intermediate Othello player. Four modes of play are offered: three skill levels of competition against the CoCo, and an additional two-player option. This pits you against another human opponent while the computer assumes the role of score keeper and rule enforcer. *CCTHELLO* gives almost instant response due to its machine language programming. The joystick input is smooth and allows you to concentrate on the logic of the game.

I have had experience playing Othello against several different computers using a variety of programs. I learned to play the game on a TRS-80 Model I using a program written in BASIC. It was very slow making moves, but offered a good challenge to my inexperienced play. I next graduated to a near master level program written by Dr. Peter Frey from Northwestern University. His program, called OTHELLO V, was almost unbeatable at its highest level of play. However, it required superhuman patience to complete a game that could take hours on the TRS-80 Model I. More recently, I have been playing Othello on a Lillith computer (a new scientific/engineering work station) programmed in a Pascal-like language called Modula-2. This version has very clever high resolution graphics as well as challenging play. It has the kinds of features that really improve your game, including options for suggesting moves when it has you in a tough situation.

Until *CCTHELLO* came along, my only experience playing Othello on the Color Computer was with a BASIC version. It had a poor display and played a relatively weak game. In contrast, *CCTHELLO* has a well-designed board display that makes good use of the Color Computer's high resolution color graphics capability. The game is programmed in machine language for fast response, and the levels of play are suited to both beginners and practiced players.

Joysticks are required for selecting game options and for moving the blinking cursor around the board to place game markers. You alternate first moves with the computer. A player always has light(yellow) markers while the computer takes the dark (blue) ones. The game also makes good use of sound to signal the moves. The score is continuously displayed on the screen in colors corresponding to the markers.

One feature of *CCTHELLO*, requiring some time to adjust, is its nearly instant response. A beginner might find it hard to visualize the consequences of his move before the computer gives its response. It would be helpful if a delay were built into the program so that a player could study the board before the computer makes its move. Most versions of Othello are slow enough that this usually isn't a problem.

Another problem with the game is in the two player mode. While playing another human opponent, it is sometimes hard to tell whose move it is. It would be helpful if the cursor would change colors to signal which player, light or dark, has the next move. This is particularly important when a player is blocked from making a move. In this case he must forfeit his turn. Without the cursor giving a cue, players must wiggle their joysticks to see who has control.

After playing many games with *CCTHELLO*, I have become familiar with its tactics at all three skill levels. I am sure that a beginner would find the first level challenging while learning the game. The third level will keep an experienced player alert at all times. It takes only one small mistake to turn the tables. Sometimes Othello can be that way. A very even scoring game can look like a complete rout when the final tally is made.

CCTHELLO is a well-executed board game for the Color Computer. It makes a fine addition to computer libraries, especially those with a tendency to become heavily populated with endless versions of space invaders and other reflex testing devices.

(Spectral Associates, 141 Harvard Avenue, Tacoma, WA 98466, cassette, $14.95, disk, $18.95)

—Stuart Hawkinson

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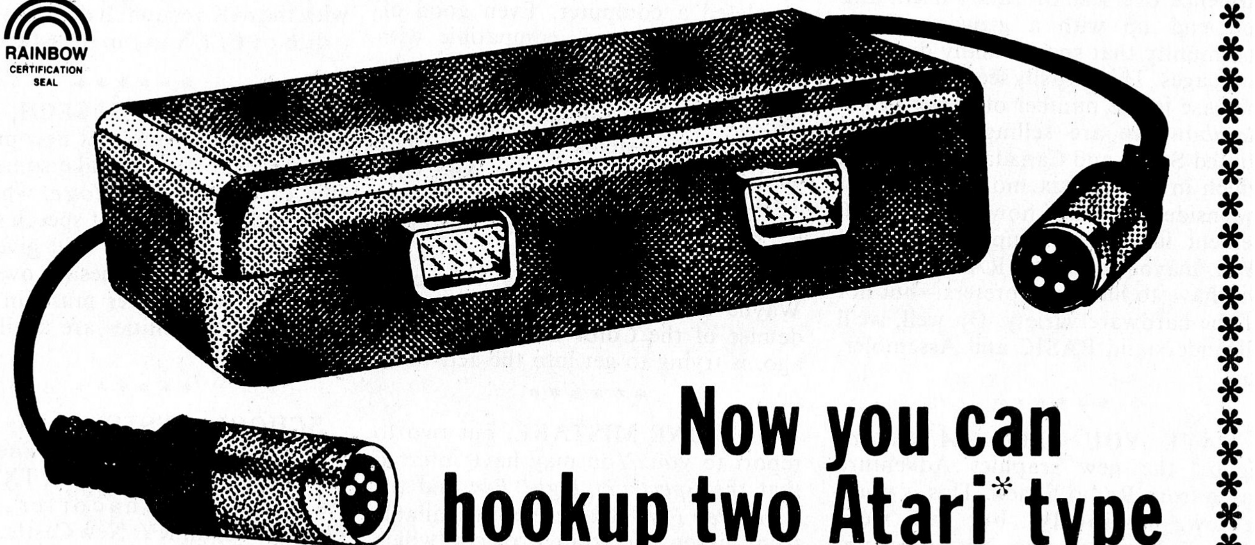

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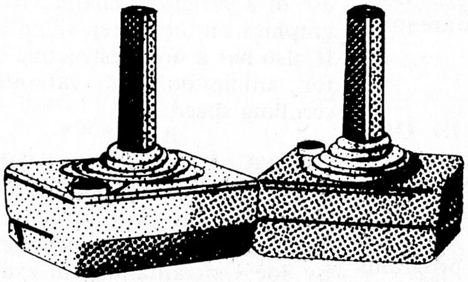

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PIPELINE

INTERNATIONALLY, THE COCO movement is really beginning to catch on. Actually, it is partly the Color Computer and partly the Dragon-32 in England and Europe. And, we understand, there is still another look-alike coming from the Far East with the name Sampo.

An interesting aspect to the new Color Computers seems to be that they are doing very well in their "native" areas. We keep hearing that Dragon will come visiting the United States and Canada (and the same for the Sampo), but what is more interesting is that these computers seen to be carving out nice niches for themselves in their own areas.

Add to that the increasing CoCo influence overseas of Tandy itself, and you end up with a growing CoCo community that speaks many different languages. This is easily seem by a heavy increase in the number of copies of *the Rainbow* we are selling outside the United States and Canada. Those sales, which in the last six months were not inconsiderable, have now grown by 200 percent in the last couple of months! Well, maybe some day RAINBOWfest will have to have interpreters—but not of the hardware variety. Oh well, we'll all understand BASIC and Assembler, too.

* * * * * *

HAVE YOU SEEN *SANDS of Egypt*, the new graphics Adventure game from Radio Shack. This is not a review, obviously, but we were impressed by the game. Yet, it was not the program itself which impressed us as much as something else—a something that was also spotted by reader Charles Perrin of Huntsville, AL.

Sands of Egypt instructions tell you that if you have Disk Extended Basic 1.0 you type in *RUN "EGYPT"* to start the game. But, it adds, if you have version 1.1, you type in *DOS* first.

All this is by way of saying that there is a new DOS ROM for CoCo, and there are, we hear, a new Basic and Extended ROM as well. Its Basic 1.2, Extended 1.1.

The new Disk ROM appears to be a way to implement the OS-9 system you have seen us talk about. You can use this as an indirect call to the disk operating system, or something like that.

We hear that the new Basic ROM fixes up some of the machine language subroutines that sometimes caused problems. And, it is our understanding that the Extended ROM fixes the problem we all had with the PCLEAR instruction.

Could that mean that CoCo is getting the final touches of its act together for a real change—or maybe a big brother sometime in the future. No, don't expect anything to come along in the next month or two along those lines, but we do hear reports of a new VDG chip that may be along soon.

Could the resolution be coming to something like 700 by 500 pixels? Could there be a 64-character screen display on the horizon? Is it possible to cram 4000 colors (that is not a misprint) onto one chip?

Before anyone gets worried about an outdated CoCo, we would like to point out that historically, Tandy has never obsoleted a computer. Even good ol' Model I software is compatible with Model III software. Or look at the Model II and the Model 16 (and now the 12). Software can, more or less, shift between like systems. Sometimes there are free or low cost upgrades. And, with Tandy's new author's assistance program, we see that practice continuing.

Yes, CoCo is here to stay. Why, even Wayne Green, who predicted the total demise of the Color Computer a year ago, is trying to get into the act.

* * * * * *

NOT ONE MISTAKE, but two to report to you. You may have inferred that the *Spectrum Light Pen* and the *Light Pen Fun-Pak* were both available from either Spectrum Projects (which markets the pen) and from Computer Island (which wrote the software). Not so, the whole package is available only from Computer Island (Dept. R, 227 Hampton Green, Staten Island, NY 10312) for $34.95. The *Fun-Pak* sells separately for $14.95. And, yes, it was an error in the Spectrum advertisment which showed the CoCo Cooler for $19.95. Correct price is $49.95. Both misprints are our fault, and we are sorry if they caused you problems.

* * * * * *

NELSON SOFTWARE IS OUT with one of the nicest-looking packages we've seen for their new *Super "Color" Library* series of programs. They have added to the *Super "Color" Writer II* and *Super "Color" Terminal* programs called *Calc, Database, Mailer, Speller* and *Disk-ZAP*. All come in handsome brown loose-leaf bindings with gold stamping. And, by the way, *Super "Color" Writer II* is into version 3.0 now, with high resolution display screens. This is also true for the new *Terminal* program.

The *Calc* program is a "what if?" spreadsheet; *Mailer* is a mail merge and correspondence program; *Database* is an electronic file and *Speller* is, of course, a spelling checker with 20,000 words.

* * * * * *

SPECTRAL ASSOCIATES TALKS TO you with a new high-resolution machine language game that incorporates words. *Android Attack* is available now and gives another dimension to CoCo that, we are sure, others will be using in the future.

* * * * * *

CORES-64 FROM CER-Comp is a new tape-based editor/assembler that can be run in any CoCo from 16 to 64K. A total of 59K of work space is available with the 64K version. It does not require a disk or FLEX to run the 64K version.

* * * * * *

SPEAKING OF SPEECH, Speech Systems has a couple of new products out that will let you make some noise. One of them is *The Voice*, which lets you produce all sorts of speech sounds. *The Stereo Composer* will give you a four-voice music synthesizer over seven octaves that produces music in stereo! Both of these utilities are available as ROM Packs.

* * * * * *

SCHOOL SYSTEMS IN Spring Valley, NY; New York City; Poca, WV; La Mesa, CA; San Antonio, TX; Buena Park, CA; Anacortes, WA; Elizabethtown, KY; New Castle, IN and Abilene, TX have been awarded Educational Grants Awards by Radio Shack's Educational Division. School systems can make application for another set of awards up until March 31.

* * * * * *

BERTAMAX HAS A NEW program called *Colortext* that allows use of a variety of character fonts and graphics on the screen simultaneously. It also has a non-destructive overwrite for animation and variable screen scrolling speed.

* * * * * *

HOWARD SAMS BOOK publishers has announced a new series of books dealing with microcomputers. The first two books in the series, written by Joe Giarrantano, will examine the evolution of computer technology and modern computer concepts. Two others will deal with BASIC.

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Software Review...

Like To Live Dangerously? *Minefield's* A Blast

Those among us fortunate enough to have avoided actual combat will be able to enjoy *Minefield*, a game simply conceived, yet challenging enough for the most seasoned of computer war-game veterans.

The object, of course, is to cross an area that has been peppered with hidden mines by the enemy. There are 10 levels of difficulty, but, believe me, none of them is easy.

After you *CLOAD* the cassette, the computer requires several seconds setting up the mine field, sounding short beeps as each mine is placed. Those of you without joysticks will be glad to know that the game uses the arrow keys to negotiate the course.

You'll be even happier to know that you are provided with a mine detector that sounds once for each mine touching the invisible square that you occupy. It tests all four sides, including the corners, so there are eight possible locations. However, the mine detector doesn't tell you the exact positions of the mines. So, even with a warning, you are never out of danger. Step on a mine and you are blown to smithereens!

If you're lucky enough to make it through the mine field alive (I never have), your score is contingent upon how many moves are required, as well as the difficulty level. While any mention of mine fields usually brings to mind someone gingerly stepping along trying to avoid triggering the notorious and deadly "Bouncing Betty" or Claymore antipersonnel mines or maneuvering heavy equipment past antitank mines, the most destructive of all, the term *mine* dates back to the time when soldiers would actually mine tunnels underneath enemy trenches and forts, then pack them with gunpowder and *BOOM*. During the Civil War, the Union forces tunneled under the Confederate entrenchment at Petersburg, Virginia, and blew such a hole that the engagement is now known as the Battle of the Crater.

As you play *Minefield*, you are reminded of the terrors of war and should be able to empathize with those among us who have experienced the feeling of possible extinction with the next footstep. Melodramatic? Perhaps, but it is one of the things you experience as you enjoy the game.

(Valhalla Enterprises, P.O. Box 243, Sumner, WA 98930, $4.95 on tape)

—Charles Springer

Software Review...

Tower of Fear: Despite Death, A Fun Adventure

Tower of Fear is a moderately difficult word adventure. It has death (I got killed at least three different ways), treasures, and several surprises. This adventure takes place in Graylockland at the castle of the late Blackheart Firethrower. That is, if you can get into the castle, ha ha. Blackheart Firethrower's castle has been inhabited by wraiths and cyclopes for the past three hundred years. No one, Sir Adventurer, has ever returned with even one of Blackheart's valuable treasures.

With excellent assistance from my wife, I was able to find all the treasures in four or five hours of playing time. I found all the treasures by using imagination, courage, skill(?), magic, and luck. I found it certainly doesn't pay to go wandering aimlessly around in a maze of corridors. It seems the unfriendly cyclopes kill first and ask questions later.

Tower of Fear has a couple of nice features I really like. One is that about six seconds after the program starts loading a graphic title page is uncovered line by line. The other feature is that during play the screen uses reverse video. This makes a much more interesting and easy to read screen. The one- and two-word commands used in the game are not dissimilar from any other word adventure.

The game is written for 16K and is in machine code. I was somewhat disappointed in the documentation for the game. The single sheet of paper that came with the cassette provides the setting for the adventure, but gives no information on how to play the game. Therefore, I would not recommend this as a first adventure, but if you have had some experience with word adventures, then I'm sure you'll like this one. Another complaint I have with the documentation is it gives you instructions to *CLOAD* the tape, but since it is in machine code you have to *CLOADM* it.

One other problem I had was that I could not successfully save a game in progress. After making a couple of calls to Bob Little of The Programmers Guild I found out the problem. When saving a game you have to use eight characters for a file name or the program won't recognize your data file.

All in all, this is a fun adventure game. I recommend it.

(The Programmer's Guild, P.O. Box 66, Peterboro, NH 03548, $19.95)

—Michael Hunt

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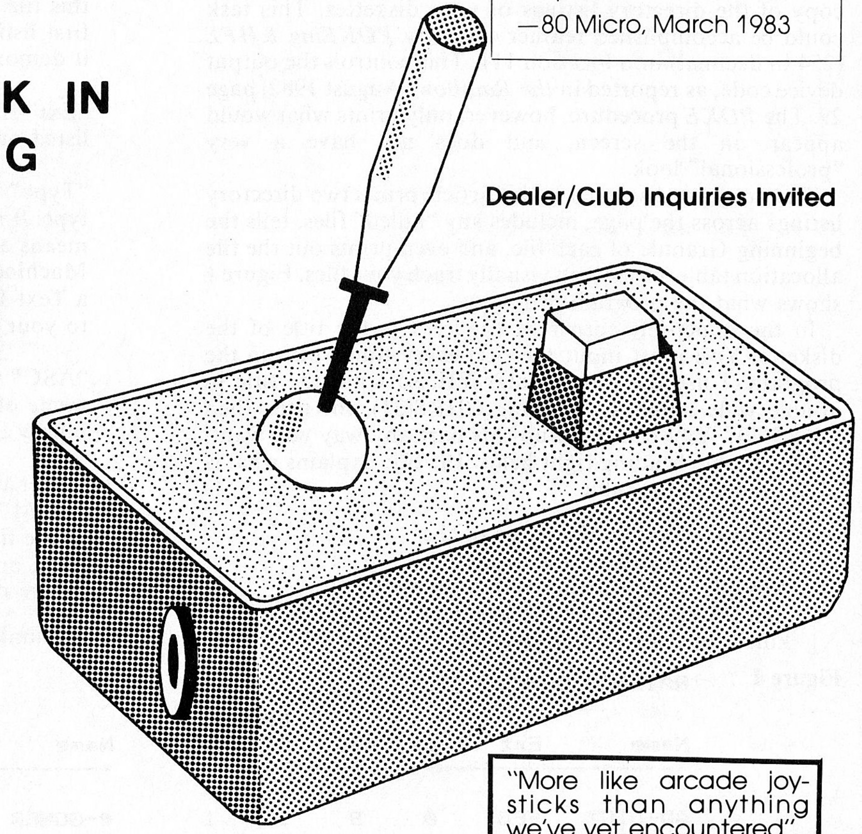

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Hard Copy Your Diskette Listings With Style

By Michael Plog

The basic idea of this program is to produce a printed copy of the directory listings of your diskettes. This task could be accomplished reather easily by *POKEing &HFE* (254 in decimal) into location 111. This controls the output device code, as reported in *the Rainbow*, August 1982, page 29. The *POKE* procedure, however, only prints what would appear on the screen, and does not have a very "professional" look.

The program discussed in this article prints two directory listings across the page, includes any "killed" files, tells the beginning Granule of each file, and even prints out the file allocation table, so you can visually track your files. Figure 1 shows what the program produces.

In the upper-left corner of Figure 1 is the title of the diskette. You must input the title every time you run the program. I use the Line Printer VII, so I put the title in double wide letters by printing CHR$(31), the title, then CHR$(30). You can dress up this part any way you want.

The double heading right below the title explains what is to be found in the table.

"Name" refers to the name of the file, as recorded on the diskette. Any file name starting with a number sign (#) indicates the file has been killed, but not written over. (If you wish, you can try to recover this file.) For example, note the first listing in the right column; it demonstrates a killed file.

"Ext" is the extension name listed on the diskette.

"Type" refers to the file type: 0 means a BASIC program; 1 means a BASIC data file; 2, a Machine Language Program; and 3 a Text Editor source file. (Refer to your Disk Owner's Manual.)

"ASC" refers to the storage mode of the file. A "B" indicates binary format; "A" is ASCII format.

Under the "GRANULE" heading, "NUM" is the number of Granules in the file. "ST" indicates the start, or beginning, Granule. (More on this later.)

The number of free granules is printed following the

Figure 1

```
RAINBOW SAMPLE DISK

                           GRANULE                                GRANULE
Name      Ext  Type  ASC   ST  NUM     Name      Ext  Type  ASC   ST  NUM
----------------------------------     ----------------------------------

AD-DICT   FEB    0    B    32   1      #-GONER   FEB    0    B    33   1
UTILITY   FEB    0    B    30   4      DATING    FEB    0    B    38   1
FRACTION  FEB    0    B    39   4      HANGMAN   FEB    0    B    26   3
HOMONYMS  FEB    0    B    25   1      INCOMTAX  FEB    0    A    43   5
MARQUEE   FEB    0    B    22   1      PREFIX    FEB    0    B    23   3
PRNTCHG   FEB    0    B    18   1      TAPECAT   FEB    2    B    19   1
TAX*HIST  FEB    0    B    48   2      THE WORD  FEB    0    B    16   3
VROOM     FEB    0    B    50   2      OUTPOST5  FEB    0    A    15   2
PLUGNPOW  FEB    0    B    52   1      BANNER    JAN    0    B    53   2
SIGN      JAN    0    B    13   2      AHHA      FEB    0    B    55   5
ACCOUNT   FEB    0    B    11   4      PRTDIR    MAR    0    B    34   1


 19 FREE GRANULES


FILE ALLOCATION TABLE

          1         2         3         4         5         6
01234567890123456789012345678901234567890123456789012345678901234567

22222212001010100011012011000100122222100010000102011010000122222222
55555595009091911199290299222932950555944494444940599595555955555555
55555545964880527483160087749418650555012545678901784567894555555555


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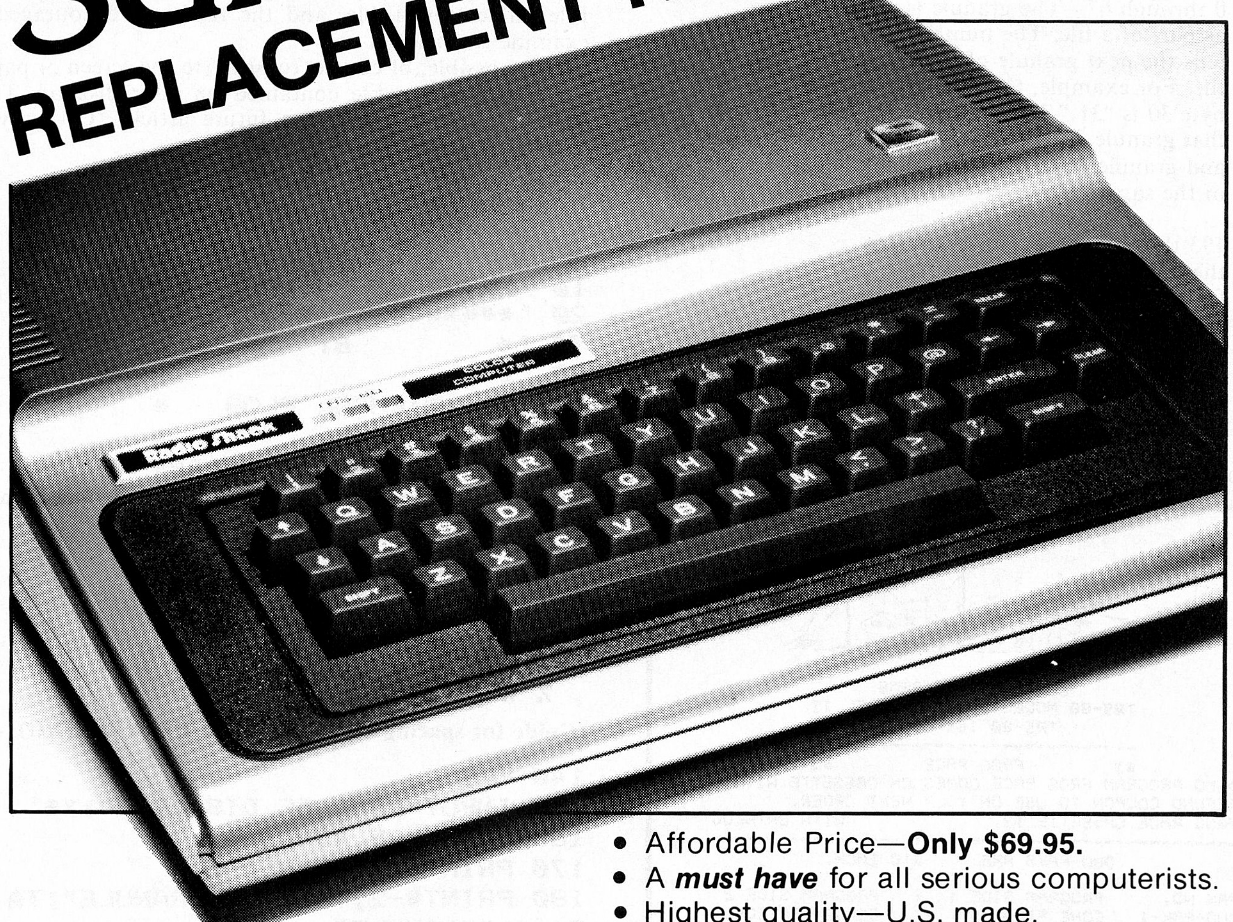

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listings of the files. This number may be misleading. If you have erased some files, the number of free granules may not reflect this.

At the bottom of Figure 1 is the File Allocation Table. The top row of numbers is a counter, for the sixty-eight granules of the diskette, numbered from 0 to 67. The bottom set of numbers indicates the contents of each byte of the File Allocation Table, in ASCII format (not Hex format). The numbers are to be read from top to bottom, in a single column. For example, byte 0 (the first one) of the File Allocation Table contains a "255." The meanings of the numbers contained in the File Allocation Table are:

> 255—The granule is not part of a file; it is a "free" granule.
>
> 0 through 67—The granule is used as part of a file. The number tells the next granule of the same file. For example, the number in byte 30 is "31." This means that granule 30 is part of a file and granule 31 is the next granule of the same file.
>
> 193 through 201—This granule is the last in a file. Subtract 192 from the number to learn how many sectors of this granule are part of the file. For example, a "195" means that three of the nine sectors are part of the file; six sectors are unused.

In order to make use of the File Allocation Table, refer back to the numbers listed under GRANULE, in the ST column. This number shows the first granule of each file. Now, look at the number in that corresponding byte of the File Allocation Table. For example, the first program listed in Figure 1 is *AD-DICT.* The program begins on granule 32, and uses one granule of the diskette. In the File Allocation Table, byte 32 contains a "196." That means that four of the nine sectors are used for *AD-DICT. Hangman* starts in granule 26. The second granule of the file is 27 (this is found from the file allocation table entry for byte 26). The last granule of the file is 24, and the 198 means that six sectors are used and the remaining three are unused.

The File Allocation Table, as printed in Figure 1, allows you to visually track all the files (programs and data) on the diskette.

The Disk Owner's Manual gives some explanation of the File Allocation Table, and the reader is encouraged to examine the manual.

It is possible, of course, to print (to the screen or paper) each byte of any file contained on your diskette. That, however, is a subject for a future article. (Or for your experimentation.)

```
10 'PRINT DIRECTORY PROGRAM
20 '*********************
30 '*        BY         *
40 '*                   *
50 '*   MICHAEL PLOG    *
60 '*                   *
70 '*********************
```

Get ready to start, set up variables, print headings, read in file allocation table.

```
100 PCLEAR1:PMODE0
110 CLEAR 2000
120 DIM P$(2,6),Q$(68,3)
130 U$="%       % % %   % %   %%
  % %  % %"
```

(Guide for spacing of U$; used in a PRINTUSING)

```
140 CLS
150 INPUT"NAME OF DISKETTE";X$
160 PRINT#-2,X$
170 PRINT#-2:PRINT#-2
180 PRINT#-2,TAB(27)"GRANULE";TA
B(66)"GRANULE"
190 PRINT#-2,"Name       Ext  Typ
e  ASC   ST  NUM";TAB(39)"Name
   Ext  Type  ASC   ST  NUM"
200 PRINT#-2,STRING$(34,45);TAB(
39)STRING$(34,45)
210 PRINT#-2
220 DSKI$0,17,2,F$,X$
```

Read in the directory listings, on track 17, sectors 3 through 11.

```
300 FOR Z=3 TO 11
310 DSKI$0,17,Z,A$,B$
320 X$=A$:GOSUB 400
330 X$=B$:GOSUB 400
340 NEXT Z
```

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```
350 GOTO 700
```

Print the directory listings, two across.

```
400 FOR J=1 TO 128 STEP 64
410 FOR R=1 TO 2
420 Y=(R-1)*32
430 P$(R,1)=MID$(X$,J+Y,8)
440 IF LEFT$(P$(R,1),1)=CHR$(255
) THEN 700
450 IF LEFT$(P$(R,1),1) = CHR$(0
) THEN P$(R,1) = CHR$(35) + RIGH
T$(P$(R,1),7)
460 P$(R,2) = MID$(X$,J+Y+8,3)
470 P$(R,3) = STR$(ASC(MID$(X$,J
+Y+11)))
480 X = ASC(MID$(X$,J+Y+12,1))
490 IF X<>0 THEN P$(R,4)="A" ELS
E P$(R,4)="B"
500 X = ASC(MID$(X$,J+Y+13,1))
510 P$(R,5)=STR$(X)
520 GOSUB 600
530 PRINT#-2,USINGU$; P$(R,1); P
$(R,2); P$(R,3); P$(R,4); P$(R,5
); P$(R,6);
540 IF R=1 THEN PRINT#-2,TAB(39)
; ELSE PRINT#-2
550 NEXT R
560 NEXT J
570 RETURN
```

Calculate the number of granules in each file.

```
600 G=0
610 G=G+1
620 B = ASC(MID$(F$,X+1,1))
630 IF B<70 THEN X=B:GOTO 610
640 P$(R,6)=STR$(G)
650 RETURN
```

Print the free granules of the diskette and the heading for the file allocation table.

```
700 PRINT#-2:PRINT#-2
710 PRINT#-2,FREE(0)"FREE GRANUL
ES"
720 PRINT#-2:PRINT#-2
730 PRINT#-2,"FILE ALLOCATION TA
BLE"
740 PRINT#-2
750 FOR I=1 TO 6
760 PRINT#-2,TAB(10*I)CHR$(48+I)
;
770 NEXT I
780 PRINT#-2
790 FORJ=1 TO 6
800 PRINT#-2,"0123456789";
810 NEXT J
820 PRINT#-2,"01234567"
830 PRINT#-2
840 PRINT"WAIT A MOMENT"
```

Set up the bytes of the file allocation table to be printed. Convert the bytes in the file allocation table to the ASC equivalent.

```
900 FOR I=1 TO 68
910 Y$=MID$(F$,I,1)
920 Y=ASC(Y$)
930 Y1$=STR$(Y)
940 ON LEN(Y1$) GOTO 950,960,990
,1010
950 PRINT"SHOULD NEVER GET HERE"
:STOP
960 Y1$="0"+Y1$
970 MID$(Y1$,2,1)="0"
980 GOTO 1020
990 MID$(Y1$,1,1)="0"
1000 GOTO 1020
1010 Y1$=RIGHT$(Y1$,3)
1020 FORJ=1TO3
1030 Q$(I,J) = MID$(Y1$,J,1)
1040 NEXT J
1050 NEXT I
```

Print the file allocation table.

```
1100 FORJ=1 TO 3
1110 FORI=1 TO 68
1120 PRINT#-2,Q$(I,J);
1130 NEXT I
1140 PRINT#-2
1150 NEXT J
```

Final touches on the print-out to make it look “purty“

```
2000 PRINT#-2:PRINT#-2
2010 PRINT#-2,STRING$(80,61)
2020 PRINT#-2
2030 END
```

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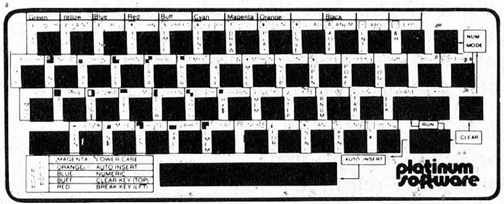

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More Organization: Create A Tape Register

By Joseph Kolar

There *is* light at the end of the tunnel! Now that you have your cassette tapes organized, there is one final household chore to get out of the way.

You are about to create a tape register. The definition and scope of the tape register will become self-evident as you proceed. On the outside cover of the notebook you were asked to purchase, stick two strips of labeling tape (neatly centered!). With a black, felt-tipped pen, neatly letter "tape index" or "tape register."

Open the notebook, and fold it so that you can rule lines on the inside cover. Draw a horizontal line about one inch below the top, across the inside cover, using a black, felt-tipped pen. A half-inch below that line, rule another line. About 1½ inches below that, rule a line. A half-inch lower, rule another line.

About one inch lower, rule a line. A half-inch lower, rule another. About an inch and a half lower, rule a third line. Count up three lines. Make a vertical line, about the width of a ruler, from the left margin and connect the three bottom lines. Make a second vertical connecting line about the width of the ruler, from the last line you drew. About 1½ inches from the right edge of the notebook, rule a third connecting line.

About an inch below the last line you ruled, rule as many lines as space will allow, about a half-inch apart, horizontally, until you reach the bottom of the page. About a ruler's width from the left margin, draw a vertical ruled line, connecting the series of lines that you ruled horizontally.

Using a red, felt-tipped pen, neatly center and print "tape index" or "tape register" between the top two lines. Between the third and fourth lines, print "format." Drop down to the next two lines, which are broken into four segments. With a regular black pen, in the left box, print "name." In the next box, print "comments." In the third, largest box, print "description" and in the right-hand box, print "evaluation."

If you have about ten boxes in the bottom portion of the inside cover, you are in business. Into the small area to the left, copy the first part of the following list, and in the large area, copy in the explanation. Of course, you can improvise your own list that best conforms with your system.

JS	Joysticks required
JS/K	Joysticks or keyboard optional
PCLEAR1	Clear memory required
*	Graphic hi-res display
Text	Text only
Graphic	Graphics lo-res
S	Sound included
U	Utility program
T	Tutorial program
X	Experimental program
T/G	Graphic/Text combo
ML	Machine language

You will notice 12 categories listed. You may choose the ones you need or add others.

With a black, felt-tipped pen, beginning at the first page, in the lower, right-hand corner, print "A." Flip the page over and in the lower left-hand corner, print "A." Print "B" on both sides of the next sheet and continue through "Z." Letter the next nine sheets "1" through "9" on both sides in a like manner.

Return to page "A." A ruler's width from the red printed line, rule a vertical line from the top blue line to the bottom blue line. A ruler's width from the right edge, rule a second line. Do the same to all the pages that you lettered or numbered. For now, you need only to rule the right-handed pages. At your option, draw a line in black ink over the top blue printed line. It doesn't cost anything and gives it a finished appearance.

> ***"Any program that you figure is 'lousy' shouldn't be CSAVED. There is no need to clutter up your personal library with junk."***

Congratulations! You have just completed your personal index.

For the sake of argument, say that on side two of your "B" labeled tape, you have a program named *Quadstar.* It is a space war type game that has hi-res graphics with sound and you may use either joysticks or arrows on the keyboard. It is an excellent game but you have to *PCLEAR* to get enough memory.

Turn to right-hand page "Q." On the top line, in the box that corresponds to the "name" box under "format" on the inside cover, print in black ink *Quadstar.* On the line underneath it, in red ink, print the address, "B2" (tape B, 2nd side). In the next column, put a "*" because it is hi-res graphics. Next to it put "S" to designate sound. (Sometimes you forget to turn up the sound!) Underneath, in the same column, put "JS/K" to indicate that joysticks or the keyboard are optional. In the next column, write in "space war game" and some other comments of your choice that you deem necessary. At the end of the second line, print *PCLEAR.* In the last column, print your evaluatin of the program. In this instance, it is "excellent." Finally, rule a black line over the blue printed line under the second row, to close out the entry.

You can use designations such as "super," "good," "very

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good" to describe the rating you give to the quality of the program. Remember, this is your evaluation! Not somebody else's. Any program that you figure is "lousy" shouldn't be *CSAVED*. There is no need to clutter up your personal library with junk.

Go through all your tapes and enter them into the index. You may have to *CLOAD* and *RUN* some of the programs because you have forgotten what they were about. Once you have all of your programs listed and written up, you will have saved a lot of head-scratching.

You have finished your arts and crafts workout. It was fun to do and now your system is operational. Once again, contratulations!

Henceforth, you will be doing a lot of program transcribing. Here is a hint that will help you.

When keying in a long program, put a "scratch tape" into your cassette, (temporary storage), rewind it and set it a few counter numbers after the last program on the tape. Ideally, you should use a fresh tape, rewind it and reset the counter and run it (fast-f) to 003. You will be ready to transfer your work at a moment's notice if you are interrupted for whatever reason and must shut down.

Put a penciled tick mark next to the last line number that you listed before the interruption. Using a blank cassette index card, write in the starting counter number, a temporary program name and after you *CSAVE* what you completed, the ending counter number. Skip some counter numbers and make a second copy. You can *CLOAD* the program at a later time and continue. Do this as many times as necessary until you get a compelted program and *CSAVE* it twice elsehwere in your tape library. Finally, erase both the temporary storage tape and the penciled notations on the index card, and the temporary storage tape is ready for its next mission.

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Software Review

Stinger Bee-neath Reviewer's Expectations

Picture yourself as a bee catcher about to enter a hive of honeybees with your mission to catch as many honeybees as possible without being attacked by the killer bees in the hive. That's the plot in this new arcade-style game, *Stinger*, from Spectrum Projects.

As the game starts, you look down into the hive, which is a maze of concentric circles with the head of the queen bee in the center. The principal difference between this game and all those other maze games you've been playing is that the position of the openings in the circles is constantly changing, making it appear that the hive rotates along with your bee-catcher, the bees, and the killer bees.

Now to grab that joystick and start to play. Better re-read those instructions, because you start on the periphery of the hive and to move inward you must move your joystick to the left, even if the opening is to the right! Then quick, re-center that stick so that you can stay in the circle and grab some of those "X" shaped things which are the honeybees you want to catch.

What's the diamond-shaped thing about to hit me? Must have been a killer bee, because the low buzzing noises just changed as he got me. No matter, a quick check in the upper left shows I've got five catchers left—got to be more careful this time!

I'm doing great, catching bees like fury, when—annoyance! I come upon one fellow who won't let me grab him. Now I know what the directions mean when they say it may happen that I will pass over a bee and not catch him. I consider this a major flaw.

Now, what's this? Everything is speeding up like mad and I'm still on Level 1. That's right; this is one of those games where the fewer the objects on the screen, the faster everything goes. Here's where joystick control is next to impossible. More by chance than skill, I manage to get all the honeybees, and even a time bonus. No cute picture appears between screens, and the game repeats.

The very detailed instructions which come with this game say that after Level 3 the queen may have a surprise for us. Although *Stinger* was given a thorough weekend testing by my children, ages 11 and 13, and their friends, ages 9 to 13, I'm afraid none of us have yet been able to master the joystick after the game speeds up toward the end of each screen.

There was a great deal of "I wish..." going on. "I wish I could move backwards." "I wish there were cute bee pictures." "I wish there were more sound effects." "I wish I could move the joystick the direction I want to go."

All in all, although the circular maze and changing openings make this different, we gamesters expect more sophisticated use of graphics, sound and the joystick controls than this game provides.

(Spectrum Projects, 93-15 86th Drive, Woodhaven, NY 11421, $24.95 on cassette, $29.95 on disk, $34.95 for ROM Pack.)

—Carol Kueppers

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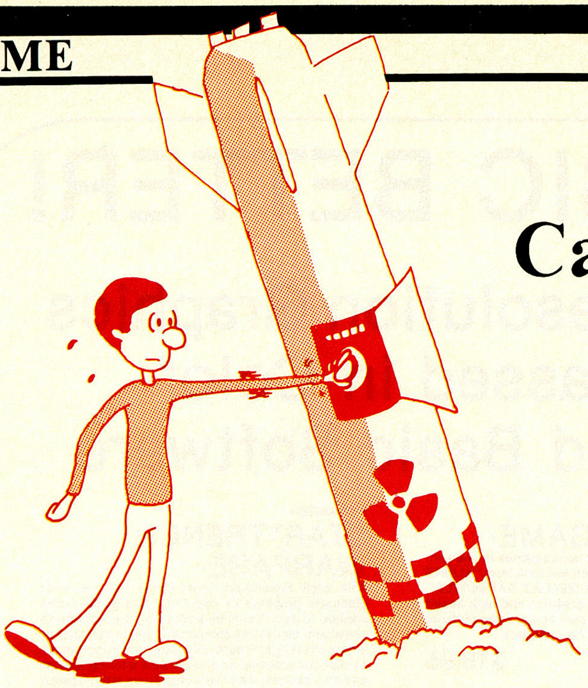

Can You Deactivate *The Bomb?*

By David A. Stewart

This is a game of chance. You must guess the correct code in order to deactivate the Atomic Bomb and keep everyone from being blown up. Since the computer is generating the number on a random basis, you can never memorize the winning numbers.

It's a simple game that my children love to play. I think other Color Computer users will enjoy it, too.

Line Description:

Lines 95-135 print the instructions and set the mood for the game. I used the INKEY function throughout the printed material so that you can read it at your own speed. If you prefer to skip the instructions, just continue to press *ENTER* until "ENTER YOUR COMBINATION?" appears at the top of your screen.

Lines 150-175 are the *GOSUB* statements which send you to the random selection of numbers sub-routine. There are five of these lines, which gives you five chances to guess the combination.

Line 177 sends you to line 195. This line is only applicable if you have not guessed the combination.

Lines 180-191 are the WIN routine. It also lets you decide whether or not to play again.

Lines 195-965 are the LOSE routine.

Line 970 sends you to line 187 where you can choose whether or not to play again.

Lines 1500-1530 are the random generator of the combination.

Lines 200 and 2050 are time delays.

User Modification

If you wish to have more chances at guessing the combination, simply add more lines between lines 150 and 177 that say "GOSUB 1500." If you want less than five chances, delete some of the lines that are already there. You should also change the last part of line 135 from 'You have five chances...' to read the actual amount you are giving them.

If you wish to make it more difficult in another manner, you can change the amount of numbers the computer can choose from. In this listing, the computer will pick a number between 1 and 10 at random. For example, if you wish to make it pick a number between 1 and 25, you would change line 1520 to: "If X=RND(25) then 180." Then you would change line 135 to read..."it is a number between 1 and 25." If you make the number span too large, you may find it very hard to win with only five chances, so you might want to increase the number of chances at this point.

177	042C
390	06BE
END	0A61

The listing:

```
75 CLS
80 PRINT@264,"CAN YOU STOP IT?"
82 PRINT@360,"BY DAVE STEWART"
90 PRINT@480,"** AS YOU READ,PRE
SS < ENTER >  TO ADVANCE THE MAT
ERIAL **"
100 Z$=INKEY$:IFZ$=""THEN100
110 CLS:PRINT"YOU ARE ON A TOUR
OF AN OLD     ATOMIC BOMB CONTRO
L SIGHT.  ALL BOMBS CONTAINED TH
EREIN WERE    SUPPOSE TO HAVE BE
EN DEACTIVATEDYEARS BEFORE."
119 Z$=INKEY$:IFZ$=""THEN119
120 CLS:PRINT"SUDDENLY LIGHTS BE
GIN FLASHING, BUZZERS ARE GOING
OFF AND THE   DOORS OF THE CONTR
OL ROOM ARE   SEALED SHUT."
125 PRINT:PRINT"YOU ARE TRAPPED!
   WHAT ARE YOU GOING TO DO?  NO
 ONE CAN EXPLAINHOW IT HAPPENED;
YOU ONLY KNOW    YOU MUST STOP IT
 SOMEHOW."
127 Z$=INKEY$:IFZ$=""THEN127
130 CLS:PRINT"BELOW THE FLASHING
 LIGHTS IS A  CONTROL PANEL. THE
 SIGN ON THE  PANEL READS(IN CAS
E OF EMERGENCY,ENTER SECRET CODE
```

```
 TO DEACTIVATEBOMBS)HOWEVER,NO O
NE THERE KNOWS THE CODE."
135 PRINT"YOUR ONLY CHANCE IS TO
 GUESS THE CODE.YOU HAVE ONLY ON
E CLUE--ITIS A NUMBER BETWEEN 1
AND 10.YOUHAVE FIVE CHANCES TO G
UESS IT----GOOD LUCK!!!"
140 PRINT:PRINT"PRESS <ENTER> WH
EN YOU ARE READY TO START"
145 Z$=INKEY$:IFZ$=""THEN145
150 CLS:GOSUB 1500
165 GOSUB1500
168 GOSUB1500
170 GOSUB1500
175 GOSUB1500
177 GOTO195
180 SOUND100,5:SOUND160,5:SOUND2
00,5
185 CLS:PRINT@264,"YOU WIN!!!":G
OSUB2000
186 CLS:PRINT@264,"YOU SAVED US
ALL":GOSUB2000
187 PRINT@480,"PRESS<ENTER> IF Y
OU WANT TO PLAY AGAIN"
190 Z$=INKEY$:IFZ$=""THEN190
191 CLS:GOTO110
195 PCLS
200 PMODE4,1:SCREEN1,1:PCLS
210 CIRCLE(10,20),10:SOUND10,3:P
CLS
220 CIRCLE(15,25),12:SOUND15,3
225 PCLS
230 CIRCLE(25,32),15:SOUND20,3:P
CLS
240 CIRCLE(35,40),18:SOUND25,3:P
CLS
250 CIRCLE(50,50),20:SOUND30,3:P
CLS
260 CIRCLE(68,60),25:SOUND35,3:P
CLS
270 CIRCLE(86,70),30:SOUND40,3:P
CLS
280 CIRCLE(108,80),35:SOUND45,3:
PCLS
285 CIRCLE(129,90),40:SOUND50,3:
SOUND55,3
305 PCLS(3)
310 PMODE1,1;SCREEN1,1:PCLS
320 DRAW"BM116,192;U16H8E8U4H12E
8H4E20F20G4F8G12D4F8G8D16"
325 FORS=55TO255STEP5:SOUNDS,1:N
EXTS
330 CIRCLE(100,144),20
340 CIRCLE(100,124),15
350 CIRCLE(115,115),20
360 CIRCLE(130,100),30
370 CIRCLE(145,115),20
380 CIRCLE(160,124),15
390 CIRCLE(160,144),20
400 CIRCLE(80,164),25:CIRCLE(80,
138),18
410 CIRCLE(95,125),25:CIRCLE(155
,125),25
420 CIRCLE(170,138),18:CIRCLE(17
0,164),25
430 CIRCLE(95,100),30:CIRCLE(60,
125),30
440 CIRCLE(165,100),30:CIRCLE(19
5,125),30
450 CIRCLE(30,140),30:CIRCLE(225
,140),30
460 CIRCLE(75,50),30:CIRCLE(100,
50),30
465 CIRCLE(130,50),30:CIRCLE(160
,50),30
470 CIRCLE(45,80),30:CIRCLE(20,1
10),30
475 CIRCLE(200,80),30:CIRCLE(230
,110),30
490 GOSUB2000
585 PCLS
590 PMODE4,1:SCREEN1,1:PCLS
600 DRAW"BM84,68;R85D2L85U2"
610 DRAW"BM120,68;H5E4D7"
620 DRAW"BM123,68;U16H12U2F14D15
"
630 CIRCLE(122,36),5
```

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```
635 CIRCLE(116,35),3:CIRCLE(130,
35),3
640 CIRCLE(117,40),3:CIRCLE(122,
44),3
650 CIRCLE(127,40),3:CIRCLE(118,
30),3
660 CIRCLE(125,30),3
670 DRAW"BM126,52;E6R3D3L1G8D12E
6R2G6"
900 DRAW"BM84,116;U20R12F4D4G4L4
F8L4H8D8L4"
905 DRAW"BM88,104;U4R8D4L8"
910 DRAW"BM106,116;U3R3D3L3"
920 DRAW"BM120,116;U4R4U12L4U4R1
2D4L4D12R4D4L12"
930 DRAW"BM138,116;U3R3D3L3"
940 DRAW"BM152,116;U20R12F4D4G4L
8D8L3"
950 DRAW"BM156,104;U4R8D4L8"
960 GOSUB2050
965 PCLS:CLS
970 GOTO187
1000 GOTO1000
1500 INPUT"ENTER YOUR COMBINATIO
N";X
1520 IFX=RND(10) THEN 180
1530 RETURN
2000 FORT=1TO500:NEXTT:RETURN
2050 FORT=1TO1000:NEXTT:RETURN
```

Software Review...

Revolution Rolls, Despite A Few 'Rough Spots'

Have you ever wondered what it would be like to drive a race car? Picture this: a car built for speed, no pollution control devices, and a total disregard for the EPA mileage ratings. I don't know about you, but I have always wanted to get behind the wheel of one of these cars and let 'er rip. Most of us will probably never get the chance to live out such a fantasy, but with a little imagination you can come close.

Revolution is a game in which you race against the clock in order to record the fastest lap time. It is much like qualifying for a race, because each lap around the track is timed separately. The graphics are similar to those of the arcade games that I have seen. The track moves from side to side, has straightaways and zig-zags, and you have to keep your car on track by moving your joystick left and right. If you go off the track you do not crash, but are slowed down until you get back on course. You can also vary your speed by moving the joystick forward and backward. In addition you have your choice of four cars in which to race, as well as many different tracks on which to qualify. *Revolution* also keeps track of the best times on all the tracks and records them on disk so that your best times are not lost when you end the program.

Playing *Revolution* is easy. First you select the car you wish to drive. Then you choose the track you want to qualify on as well as the number of laps you want to run. After each race, your average lap time and your best lap time is displayed. If your best lap time is a track record, you are then asked to enter your name for the records. At this point you can change cars or try another track if you like. The cars in *Revolution* are a VW (do I detect laughing out there?), a Porsche, a Ferrari and a Lotus. Each of these cars has its own speed and handling characteristics which are not only very different, but seem very realistic (not that I would really know).

When you get tired of racing on the tracks that are provided you can design your own. To do this, you first select the difficulty level of the track. The difficulty level determines how wide the track is. This can vary from very easy to almost impossible. You then map out the track by moving your joystick from left to right to form sweeping curves, straightaways, or whatever. After your track is done, you are given a chance to race on it before you have to decide whether or not to save it to disk.

Revolution has good graphics, but I would have liked some additional things on the screen such as road signs, scenery or the like. I also feel that the sound effects could use some improvement. These drawbacks led me to tire of the game after about one hour. The documentation supplied does a good job and, in fact, is better than that supplied with most games I have seen. Without getting into a whole discussion on the issue of software piracy, I do not feel that this review would be complete without making mention of the fact that you cannot make a backup copy of the disk that is supplied. If your disk system is like mine and occasionally wipes out your directory, it will cost you $4 to get a replacement disk. To me this is a very serious drawback.

All things considered, *Revolution* is a good program. With a few improvements however, it could be an excellent program. If you have racing in your blood you should consider taking it for a spin.

(Inter Action, 113 Ward Street, New Haven, CT 06519, $24.95 disk, $21.95 tape)

—Gerry Schechter

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Corrections

Stan Peppenhorst's "Make Authoritative Decisions With This Situational Model," (Feb., 1983, page 132), had two REM statements in Lines 10 and 20, both of which landed on our "cutting room floor" by accident. REM statements don't affect the way the program runs, right?

Wrong. Many of the subsequent lines in the program have a *GOTO10* at the end of the line. Hard to do with no Line 10.

The correction is simple. Just add a line 10, such as:

10 REM VROOM

Or, you could change the several *GOTO 10* statements to read *GOTO30.*

Ted Blatt reports the program included in his article, "Print Those Print Statements With This ML Feature," which appeared in our last issue, has an added feature you probably do not expect—or want. While it will change the *PRINT* statements to *PRINT#-2,* statements as advertised, it also puts a #-2 on *LEN* statements.

To rectify the problem, change Lines 140 and 150 and add Lines 142, 145, 148 and 149, as indicated below:

```
140 DATA 38,42,252,62,135,195,0,
1,253,62
142 DATA 137,166,159,62,137,129,
35,39,25,129
145 DATA 64,39,21,129,40,38,29,2
52,62,137
148 DATA 131,0,2,253,62,137,166,
159,62,137
149 DATA 129,255,38,12,220,31,16
,179,62,135
150 DATA 16,39,1,10,32,185,220,3
1,253,62,137,252
```

With the additional *DATA* lines, you will need to change the number 16308 (in lines 60 and 100) to 16350. The program itself is in BASIC, but generates a machine language routine which should be saved to tape and used when the utility is implemented. Prior to *CLOADMing* the machine language version, you should *CLEAR* 350,15999.

Errors also appeared in the "Unidatfl" program in December, page 120 and 123. Here are those corrections:

Delete Line 140 and Lines 1800-2060 inclusive
Delete Line 5030
Line 5035 should read: *PRINT@230, "o — open new file";*
Line 5040 should read *PRINT@262, "e — exit to basic";*

These lines eliminate the sort function and clean up the screen display.

J.D. Ray writes that in his "Income Tax History" in our February 1983 issue, page 148, you might get an *?FC ERROR* message. The problem will only occur if the range of the figures in the data statements are such that the program cannot adequately decide which graph to use. The following additions and corrections should solve any difficulties.

```
611 IF A>15 OR B>15 OR C>15 OR D
>15 OR E>15 THEN G=15 ELSE G=8
630 IF G<9 THEN GOSUB 970
```

M.P. Wilson, whose "Raindex" program was published in the January issue, reports that he has received several calls about an *?OM ERROR* in Line 20. The program was written for 32K ECB, not 16K as we mistakenly noted. Even then, says Wilson, it requires a *POKE25,6:NEW.*

For those with 16K, he suggests the following: Before loading "Raindex," do the *POKE25,6:NEW,* then reduce the size of the *CLEAR15000* and change the size of the array (same line) until the error goes away.

In Burton B. Witham's "Who Knows All Those Callsigns? CoCo Knows!" (*Rainbow* February 1983) Lines 180 through 235 and a portion of Line 240 were inadvertently left out of the accompanying listing:

```
180 PRINT@288,STRING$(32,239)
190 K$=INKEY$:IFK$="N" THEN230
200 IFK$="Y" THENRESTORE:CLS:SOU
ND180,1:SOUND200,1:GOTO60
210 IFK$="" THEN190
220 GOTO170
225 '* EXIT
230 CLS:PRINT@174,"END":FORTM=1
TO999:NEXT:CLS:END
235 '* DATA LIST
240 DATA A,USA,XX,AP,PAKISTAN,33
,A2,BOTSWANA,110,A3,TONGA,265,A4
,OMAN,050,A5,BHUTAN,20,A6,UNITED
 ARAB EMIRATES,50,A7,QATAR,50,A9
,BAHRAIN,50,B,CHINA,344,BV,TAIWA
N,344
```

We're sorry about these mistakes and regret any problems they may have caused.

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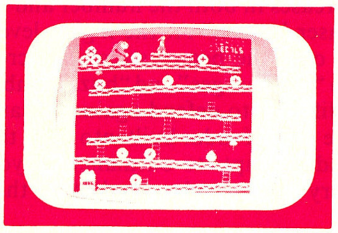

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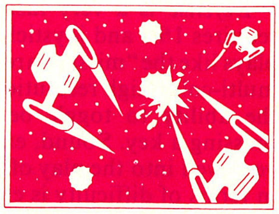

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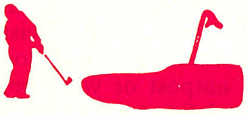

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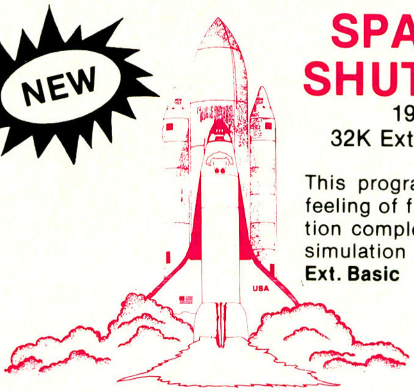

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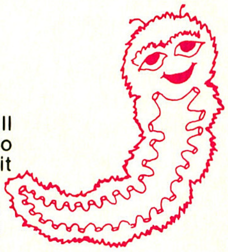

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Software Review...

As Arcade Battle Game, *Defense* Is Strikingly Good

Perhaps in keeping up with the times, Spectral Associates should have named their new program "Dense Pack" instead of *Defense*. This game is very similar to the popular arcade game in which you must defend the friendly cities from a nuclear attack.

In *Defense*, instead of defending cities, you defend outposts. The game instructions claim that you are defending them from a laser attack, but everyone knows that lasers travel at the speed of light and those are really warheads streaking across the screen trying to annihilate your ammo supply and the outposts which you are attempting to defend.

There are three outposts on each side of your main defense base where your ammo is stored. In addition, there are two extra ammo dumps which you can call upon if you run out. The play starts with the enemy "lasers" beaming slowly down onto these targets. Your defense is to fire your laser, which you direct with a joystick controlled cross hair, in front of the downwardly plummeting beam. Your laser blast causes an explosion at the location of the cross hairs which destroys the incoming beam if you are lucky enough to have engulfed it in the blast. This blast lingers on the screen long enough so that if you place it in a strategic location you can destroy several incoming beams. In the early stages of the game you have a luxurious supply of ammo but good gamesmanship dictates that you use it conservatively because part of the scoring comes from how much ammo is left in reserve after an attack is over.

In any realistic depiction of a battle of this nature, the object is to see how many of the enemy you can take with you before you are destroyed. The attacks occur in waves. After a wave, if any of your outposts have survived you are resupplied with ammo. After every other wave, the level of intensity of the attack increases in both the number and the speed of the incoming "laser beams." At the higher levels, you are subjected to not only the beams streaking across your defense screen but to "flip charges" and "buzz bombs." These weapons are very difficult to defend against because they apparently have some type of radar built into them that senses your laser blast and attempts to outmaneuver your defenses. It requires a very accurate shot to destroy these devices.

Points are scored based on the number of beams, charges, and bombs that you stop on each wave as well as the number of outposts and amount of ammo that is left. For each 10,000 points you receive a bonus outpost.

Defense is a very fast machine language program that requires 16K and joysticks. With few exceptions, this game plays like the "missile" arcade game. The graphics display, in multi-color high resolution, is good. The author has built in the ability to toggle between color sets during play by pressing a key. Sound, except as noted below, is integrated very well into the play of the game. The progression of play in terms of difficulty is excellent and will not frustrate first time users. Joystick response is quick and accurate.

I believe that *Defense* is a good piece of software, and would make an excellent addition to any Color Computer game players library. The author has thought about the little things that are often overlooked but make the difference between a good and a great game. It has easy to read on-screen scoring, and the ten highest scores are recorded arcade style with the player's initials. After your impending defeat, you can see if you made the list. The only criticism I have is very minor and is related to the lack of an explosive sound when the "beam" hits an outpost or your ammo dump. It is hard to notice this slight deficiency until you run out of ammo and have to sit back and watch your outposts destroyed by the incoming beams - in silence.

Instructions for the game are complete. Spectral Associates very nicely includes a disk version of the program on the tape, and instructions on how to load it onto a disk. They also give you a number to call if you have problems with their products. And, there is more; if you should accidentally erase the tape, for only $1.50 and the original tape, they will replace the program. Now, that is what I call "product support."

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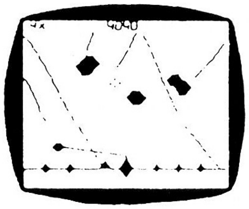

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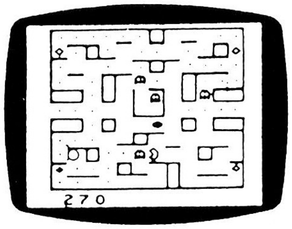

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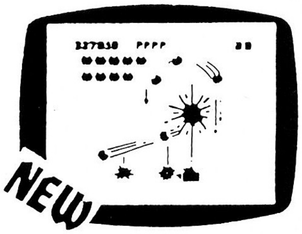

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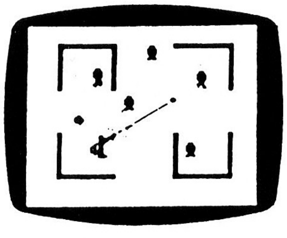

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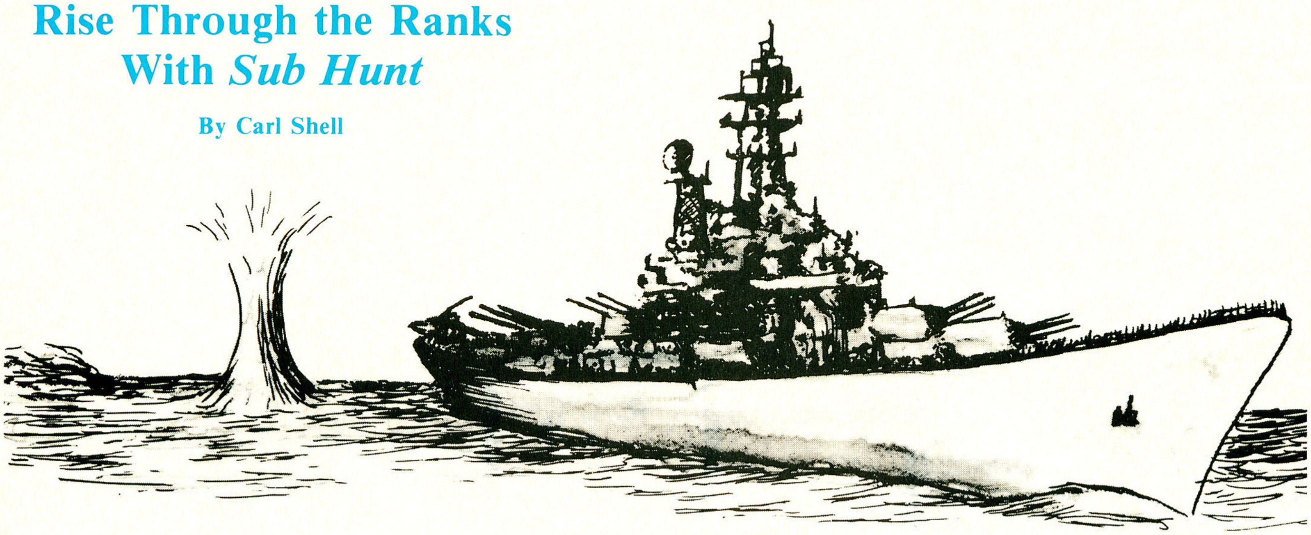
Rise Through the Ranks With *Sub Hunt*

By Carl Shell



"Two points abaft the starboard beam, mates! She steams at forty fathoms! All hands on deck." Bleeep...bleeep...bleeep...

Sub Hunt is a very easy game to learn, but hard enough to master so you won't get bored. I loaded it into a CoCo at a local Radio Shack store a few weeks ago, and the kids were still playing it several hours later when I returned. (Kids? The store manager was right in there with them!)

Instructions are included in the program and move you readily into action. You are the captain of a roving Destroyer, firing depth charges at the enemy submarine fleet in the murky waters beneath your hull. There are 10 subs to a fleet and each one is worth 10 points. If you wipe out an entire fleet, you receive an additional 50 points, and another fleet of 10 subs appears on the screen.

You have 500 units of time to rack up points, which you use to climb in rank to Fleet Commander, to Admiral of the Navy and all the way to Commander in Chief.

While playing *Sub Hunt*, you only have three keys to use to accomplish all the action: the "F" key fires the depth charges, the "G" key moves your Destroyer to the left, and the "H" key moves it to the right.

I hope you enjoy the sound effects and color I've put into the program; some of my friends who own other computers can't believe the CoCo can create the sounds it does in BASIC.

(Mr. Shell is one of the owners of S&S Arcade Supplies.)

2000	021A
4000	0503
11000	092F
12550	0C17
13750	0F25
END	1363

The listing:

```
400 CLS 8
500 PRINT@100,"DO YOU NEED INSTR
UCTIONS";
550 PRINT@263,"PRESS [Y] FOR YES
";
600 PRINT@327,"PRESS [N] FOR NO
";
650 II$=INKEY$
700 IF II$="" THEN GOTO 500
750 IF II$="Y"THEN GOTO 1000
800 IF II$="N"THEN GOTO 4100
1000 CLS3
1100 PRINT STRING$(32,"X");
1200 PRINT@96,"    ****SUB------
-HUNT****"
1300 PRINT@192,"BY         *CARL
SHELL*"
1400 PRINT@448,"REQUIRES*****EXT
ENDED BASIC-16K"
1500 FOR YYY=1 TO 2000:NEXT YYY
1600 CLS 3:PRINT@32,STRING$(32,"
X");
1700       PRINT@96,"[***]=
YOUR DESTROYER"
1800 PRINT@192,"[G]=       MOVE
SHIP LEFT"
1900 PRINT@288,"[H]=       MOVE
SHIP RIGHT"
2000 PRINT@384,"[F]=       DEPTH
 CHARGES"
2100 PRINT@448,"   TO CONTINUE P
RESS [ENTER]"
2200 IF INKEY$=""THEN 2200 ELSE
CLS 3
2300 PRINT@32,"       POINTS TO
REMEMBER"
2400 PRINT@96,"1-GAME IS 500 UNI
TS(SEC.) LONG"
2500 PRINT@160,"2-IF SUB GETS TO
```

```
 TOP L. -5 PTS."
2600 PRINT@224,"3-EACH FLEET HAS
 10 SUBS"
2700 PRINT@288,"4-EACH SUB WORTH
 10 PTS."
2800 PRINT@352,"5-EACH FLEET WOR
TH 50 PTS.
2900 PRINT@416,"6-TIME STOPS UNT
IL CHARGES HIT"
3000 PRINT@480,"   TO CONTINUE P
RESS [ENTER]"
3100 IF INKEY$="" THEN 3100 ELSE
 CLS 3
3200 PRINT@0," *************RATIN
G*************"
3300 PRINT@64,"  <   =   LESS TH
AN"
3400 PRINT@128," 500 =   COMMAND
ER IN CHIEF"
3500 PRINT@192,"<450 =   SECTRET
ARY OF NAVY"
3600 PRINT@256,"<400 =   ADMIRAL
 OF NAVY"
3700 PRINT@320,"<300 =   FLEET C
OMMANDER"
3800 PRINT@384,"<200 =   DESTROY
ER CAPTAIN"
3900 PRINT@448,"   PRESS ANY KEY
 TO C0NTINUE"
4000 IF INKEY$="" THEN 4000 ELSE
 4100
4100 PMODE 0,1:PCLEAR 1:CLEAR 10
00
4200 QQ=501
4300 DIM P(9)
4400 CLS 3:PRINT STRING$(76,144)
;
4500 PRINT@44,"SUB-HUNT";
4550 FOR X=1 TO 8:NEXT X
4600 PRINT STRING$(12,144);
4700 PRINT STRING$(32,227);
4808 PRINT STRING$(96,159);
5000 PRINT@143,CHR$(158)+CHR$(15
7);
7058 PRINT@174,CHR$(156)+CHR$(14
4)+CHR$(144)+CHR$(156);
5020 FOR R=174 TO 186
5030 FOR L=143 TO 155
10000 FOR X=0 TO 9
10050 P(X)=RND(288)+221
10100 IF X=0 THEN 10200
10150 FOR Q=0 TO X-1:IF P(X)=>P(
Q)+4 OR P(X)=<P(Q)-4 THEN NEXT Q
 ELSE 10050
10200 PRINT@ P(X),CHR$(172)+CHR$
(164);
```

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```
10250 NEXT X
10300 FOR X=0 TO 9
10350 IF P(X)=0 THEN 10600
10400 P(X)=P(X)-1
10450 IF P(X)<192 THEN PRINT@192
,CHR$(175);:GOTO 10700
10500 PRINT@ P(X)+2,CHR$(175);
10550 PRINT@ P(X),CHR$(172)+CHR$
(164);
10600 NEXT X
10650 IF A$<>"F" THEN 10750 ELSE
 RETURN
10700 PRINT@ P(X)+2,CHR$(175);:X
X=XX-5:P(X)=508: GOTO 10500
10750 A$=INKEY$
10800 QQ=QQ-1:PRINT@ 0,"SCORE="
XX ;: PRINT@21,"TIME="QQ;
10850 IF QQ=0 THEN 12950
10920 IF A$="H"THEN PRINT @96, S
TRING$(96,159);:PRINT@R+2,CHR$(1
56)+CHR$(144)+CHR$(144)+CHR$(156
);:PRINT@L+2,CHR$(158)+CHR$(157)
;
10930 IF A$="H" THEN R=R+2:L=L+2
10940 IF R<162 THEN R=162
10945 IF R>186 THEN R=186
10950 IF L<131 THEN L=131
10955 IF L>155 THEN L=155
10960 IF A$="G" THEN PRINT@96,ST
RING$(96,159);:PRINT@R-2,CHR$(15
6)+CHR$(144)+CHR$(144)+CHR$(156)
;:PRINT@L-2,CHR$(158)+CHR$(157);
10970 IF A$="G" THEN R=R-2:L=L-2
11000 IF A$="F" THEN GOSUB 11300
11200 GOSUB 10300
11250 GOTO 10750
11300 II=R
11350 FOR I=0 TO 10
11400 IF I=10 THEN SOUND 1,2
11450 II=II+32
11500 IF II>511 THEN 12100
11550 GOSUB 10300
11600 PRINT@II,CHR$(173);:PLAY"T
80;05;G"
11650 FOR T=0 TO9
11700 IF P(T)=II THEN 11750 ELSE
 11725
11725 IF P(T)+1=II THEN 11750 EL
SE 11950
11750 GOSUB 13800
11800 IF Z=10  THEN 12150
11825 PRINT@R,CHR$(156)+CHR$(144
)+CHR$(144)+CHR$(156);
11830 PRINT@L,CHR$(158)+CHR$(157
);
11850 P(T)=0:XX=XX+10:Z=Z+1:PRIN
T@II,CHR$(175);
11900 IF Z=10 THEN 12150 ELSE 12
100
11950 NEXT T
12000 PRINT@II,CHR$(175);
12050 NEXT I
12100 A$="":GOTO 10300
12150 Z=0
12200 CLS(0):PRINT@224,"ALL SUBS
 DESTROYED!!"
12250 PRINT@32,"SCORE=" XX
    "TIME=" QQ
12300 FOR TM=1 TO 15:PLAY"T45CDE
FGAB":NEXT TM
12350 FOR YYY=1 TO 800:NEXT YYY
12400 FOR AA=1 TO 7
12450 PLAY"T75C;05C;01C;05C;01C;
05C;01C;05C;01C;05C;01C;05C"
12500 CLS 3:PRINT@32,"         --B
ATTLE STATIONS--":PRINT@128,"
      ***A-L-E-R-T!***"
12550 NEXT AA
12600 CLS 3:PRINT@128,"     ANOTH
ER FLEET ON RADAR"
12650 PRINT@352,"       PREPARE DE
PTH-CHARGES!"
12700 PRINT@480," DESTROYED FLEE
T-BONUS-50 POINTS"
12750 FOR YYY=1TO8
12800 SOUND 110,3:SOUND 10,4
12850 NEXT YYY
12900 XX=XX+50:GOTO4400
12950 FOR YYY=1 TO 8
```

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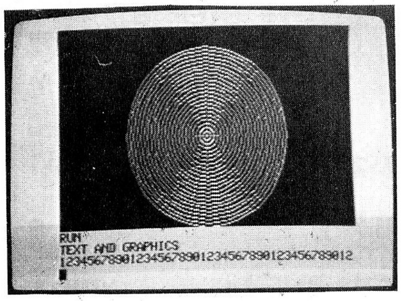
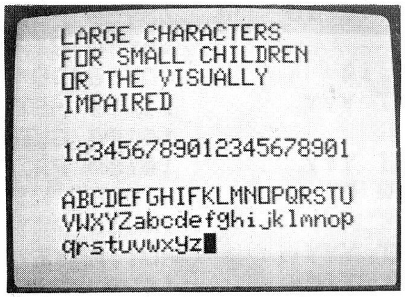


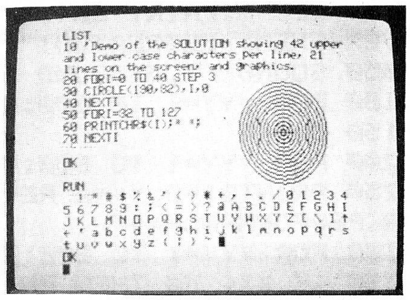
```
RUN
TEXT AND GRAPHICS
1234567890123456789012345678901234567890l2
```



```
LARGE CHARACTERS
FOR SMALL CHILDREN
OR THE VISUALLY
IMPAIRED

12345678901234567890l

ABCDEFGHIFKLMNOPQRSTU
VWXYZabcdefghijklmnop
qrstuvwxyz█
```



```
LIST
10 'Demo of the SOLUTION showing 42 upper
and lower case characters per line, 21
lines on the screen, and graphics.
20 FORI=0 TO 40 STEP 3
30 CIRCLE(190,82),I,0
40 NEXTI
50 FORI=32 TO 127
60 PRINTCHR$(I);" ";
70 NEXTI

OK

RUN
  ! " # $ % & ' ( ) * + , - . / 0 1 2 3 4
5 6 7 8 9 : ; < = > ? @ A B C D E F G H I
J K L M N O P Q R S T U V W X Y Z [ \ ] ↑
← ' a b c d e f g h i j k l m n o p q r s
t u v w x y z { | } ~ █
OK
█
```

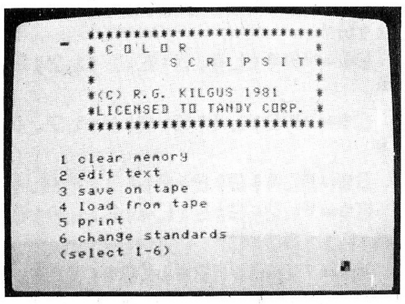
SOLUTION ON CARTRIDGE

The cartridge version of **THE SOLUTION** has all of the features of the tape version and more. It works with all of the graphic modes (including 4 colors). It includes a 51 characters per line feature and the ability to define a text window on the screen. All of this and much more at the low price of — **$34.95**

ROM-PAKS $9.95
This is an empty Rom-Pak with a PC board. It will hold either a 2716, 2732 or a 2764. The case looks very similar to Radio Shack's Rom-Pak. Comes complete with instructions.

CUSTOM PROGRAMING

We will put your program in a Rom-Pak for you for a very reasonable fee. The program can be either Basic or machine language. Prices start at $19.95 for programs up to 4K in length. $29.95 for programs up to 8K. **Volume discounts** are available. Send for a **free submittal form.**



```
**************************
* C O L O R              *
*        S C R I P S I T *
*                        *
*(C) R.G. KILGUS 1981     *
*LICENSED TO TANDY CORP.  *
**************************

1 clear memory
2 edit text
3 save on tape
4 load from tape
5 print
6 change standards
(select 1-6)
```

SCRIPTFX $9.95

Are you tired of the upper case display of Color Scripsit? Well then **SCRIPTFX** is for you. This is a program which converts the display of Color Scripsit over to a real display of upper and lower case letters with descenders. The program allows all of the features of Scripsit to function and comes with a money back guarantee if it does not work. Please specify machine type when ordering. Extended Basic is not required.

SUPER PILOT $12.95
An enhanced version of Pilot for use with Extended Basic. Includes features for math, graphics, and sound. Has a feature that makes it easy to create flash card type drill programs. Programs are pseudo compiled for faster execution. Comes with as 24 page tutorial manual and demo programs. Sample program included on tape to get you started.

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- provides a screen of **42 characters** by **21** lines displayed
- linked directly to basic — program is transparent to the user
- prints all 96 ASCII characters, lowercase characters have descenders, has a slashed **zero** to avoid confusion when programing
- prints characters on any two-color graphic screen
- graphics and text may be intermixed on the same screen
- special mode with 4 lines of text at the bottom of the screen (just like some other famous color machines) — great for working with graphics
- large character mode for small children or the visually impaired
- character set may be reversed
- written in machine language, program is relocatable
- fast — prints at over 600 characters per second
- works with both cassette and disk
- includes a 20 page manual with demo programs (a lunar lander program is included)

SOLUTION $14.95

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Still want more than 42 characters per line from your computer. Then the **EXTENDER** is for you. This program when used with **THE SOLUTION** will give a display of **51** characters per line by 21 lines displayed. Please include your program serial number when ordering.

GRAPH LABEL $8.95
Have you ever wanted to place characters on a graphic screen but couldn't find an easy way to do it. Well then **GRAPH LABEL** is for you. This program will enable you to place characters anywhere on a graphic screen. It will place any of 96 ASCII characters on the screen or you may create your own characters. It features a cursor that may be moved anywhere around the screen with out rubbing out what it goes over. Superscripts and subscripts may be used since the cursor may be moved vertically and horizontally in steps as small as one pixel. Lowercase characters have descenders. **GRAPH LABEL** is written in Basic and is therefore easy to modify. It may be used by itself or as a subroutine.

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A package of 2 programs for use with the LPVII, LPVIII, DMP100, DMP200, DMP400, DMP500. The programs will print an image of what is on a graphic screen to the printer. Both programs work with all the standard PMODEs. The programs are written in machine language and may be moved anywhere in memory. The two programs are:

1) **SCREEN PRINT** — will produce a regular size print. The image may be located anywhere on a page.

2) **DOUBLE SIZE SCREEN PRINT** — this program will produce a full size image that will fill up a sheet of paper. The finished product is 8 by 6.5 inches in size. Your computer graphics look really good when they are printed out with this program.

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Canadians — please send money orders only.

All orders shipped within 5 working days.

```
13000 CLS 3:PRINT @64,"BATTLE IS
 OVER-ENEMY RETREATED!"
13050 SOUND  1,3:SOUND 110,10
13100 FOR YYY=1 TO 600:NEXT YYY
13150 CLS 3
13200 FOR YYY=1 TO 800:NEXT YYY
13250 PRINT@192,"**A REVIEW OF Y
OUR PERFORMANCE**"
13300 FOR YYY=1 TO 800:NEXT YYY
13350 IF XX< 50 THEN PRINT"STICK
 TO RAFTS":GOTO 14900
13400 IF XX<100 THEN PRINT"SAFE
IN A ROW BOAT":GOTO14900
13450 IF XX<150 THEN PRINT"DINGH
Y PILOT":GOTO 14900
13500 IF XX<200 THEN PRINT"P.T.C
REWMAN":GOTO 14900
13550 IF XX<300 THEN PRINT"DESTR
OYER CAPTAIN":GOTO 14900
13600 IF XX<400 THEN PRINT"FLEET
 COMMANDER":GOTO 14900
13650 IF XX<450 THEN PRINT"ADMIR
AL OF THE NAVY":GOTO14900
13700 IF XX<500 THEN PRINT"SECRE
TARY OF THE NAVY":GOTO14900
13750 PRINT"COMMANDER-IN CHIEF":
GOTO14900
13800 CLS(0)
13850 PCLS
13900 SCREEN 1,1
13950 FOR I= 2 TO96 STEP 8
14000 CIRCLE (128,96),I:PLAY"T70
CDEFGABC"
14050 NEXT I
14100 CLS(0)
14150 PRINT@32,"     THAT WAS A
DIRECT HIT!"
14200 PRINT@160,"          GOOD S
HOT MATE"
14250 PRINT@384,"           YOU S
UNK IT!"
14300 PLAY"T99C;01C;05C;01C;05C;
01C;05C;01C;05C;01C;05C;01C;05C"
14350 FOR TM=1 TO2
14400 PLAY"T255CDEFGABCDEFGABCDE
FGABCDEFGABC"
14450 NEXT TM
14500 FOR TT=1 TO600:NEXT TT
14550 CLS 3:PRINT STRING$(76,144
);
14600 PRINT@44,"SUB-HUNT";
14650 PRINT STRING$(12,144);
14700 PRINT STRING$(32,227);
14750 PRINT STRING$(96,159);
14850 RETURN
14900 A$="T5;C;E;F;L1;G;P4;L4;C;
E;F;L1;G"
14950 B$="P4;L4;C;E;F;L2;G;E;C;E
;L1;D"
15000 C$="P8;L4;E;E;D;L2.;C;L4;C
;L2;E"
15050 D$="L4;G;G;G;L1;F;L4;E;F"
15100 E$="L2;G;E;L4;C;L8;D;D+;E;
G;L4;A;L1;03;C"
15150 X$="XA$;XB$;XC$;XD$;XE$;"
15200 PLAY X$
15250 CLS 5:PRINT@96,"**WOULD YO
U LIKE TO PLAY AGAIN**"
15300 PRINT@256,"        ENTER [
Y] FOR YES"
15350 PRINT@320,"        ENTER [
N] FOR NO"
15400 II$=INKEY$
15450 IF II$=""THEN 15300
15500 IF II$="N" THEN 15600
15550 IF II$="Y" THEN 15950
15600                   CLS 0:PRI
NT@128,"        ***OK MATE***"
15650 PRINT@352,"    ***YOU ARE
DISCHARGED***"
15700 FOR YYY=1 TO 400
15750 NEXT YYY
15800 CLS 0
15850 FOR  YYY=1 TO 100:NEXT YYY
15900 GOTO 15600
15950 RUN
16100 PRINT@256,"PRESS        ENT
ER"
```

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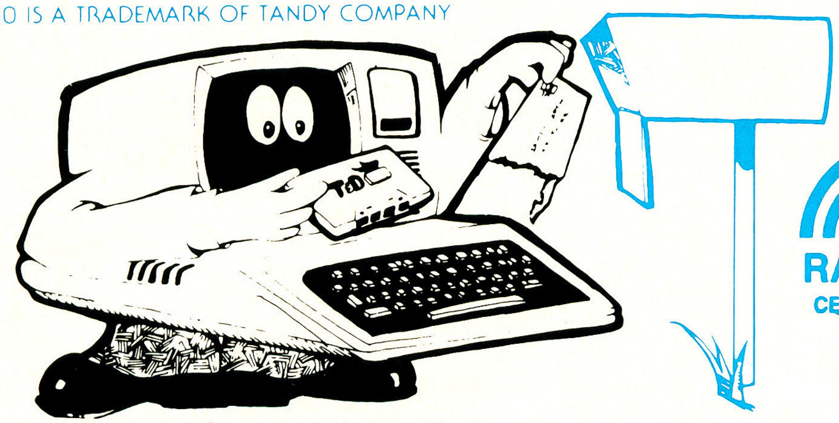

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Manual Review...

Micro-Doc: An Aid To Organization and Access

Have you ever forgotten which of your disks or tapes held that favorite program? Did you ever forget exactly when the warranty ran out on your recently broken printer? Did you ever forget just where that little bit of crucial information is found? Well, all of the above, and then some, have happened to me. That is, until I received *Micro-Doc*.

"What is *Micro-Doc*?" you ask. *Micro-Doc* is an 8½x11, 29-page, stapled documentation manual which offers easy documentation to keep all of your information about hardware and software.

A general introduction to the use of the manual is followed by some organizational tips, and then three sections on control of your equipment, data files and programs. It also contains a summary, a glossary and a very handy master set of eight forms to aid you in the control and documentaton of your efforts.

You don't have to be a technical genius to understand these simple documentation procedures. *Micro-Doc* comes with eight easy to use forms, which you can photocopy or order from Micro-Doc. These sheets help you organize and easily access all useful information. After a few tries I started filling out these forms without giving them much thought. They're that easy to use! Many friends found them easy to use also. And the instructions are easily followed and understood.

(Micro-Doc, 97 Montowese Trail, Wallingford, CT 06492. $12.95)

—Dave Mercer

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*T.M. of Tandy Corp.

Software Review...

Clock Gives Reviewer Hard Time—Vice Versa

Clock is a program that teaches children to read a clock and teaches the relationship between analog and digital formats. Apparently not a well thought-out educational program, *Clock* starts by asking you if you want just the analog clock or analog and digital. You are then asked how many questions you want to answer before receiving a score. Unfortunately, you are never again allowed to set these parameters, and are stuck with whatever you start with.

You are shown a clock face with a random time. This is always in multiples of five minutes. There is no provision for learning the hours alone or for learning times that aren't multiples of five like 12:33.

The best feature of this program is its ability to accept different forms of time telling. Word inputs like "After, Till, Quarter, and O'clock" can be used. You can say 110, 0110, or 10 After 1 and the program will understand them all. However, you cannot use "50 Till 2" even though it is correct. By the same token, "50 After" the hour is considered wrong even when it is correct.

A big problem is correcting mistakes when keying in an answer. There is no ability to backspace. Instead, the clear key in this 16K Extended BASIC program is used to erase the bottom of the screen where the answer is entered. This is slow and forces the child to start their answer over again completely.

A wrong answer is erased and a sound is heard. A correct answer is erased, the word "GOOD" appears for a moment and a different sound is heard. My daughter, who is learning to tell time but cannot read yet, has trouble telling if an answer is correct or not. In fact, the wrong answer sound is more interesting.

At the end of a round, a score is printed that indicates how well a child has done but not where that child is having trouble. You are then asked if you want to continue. If you say "yes" you are returned to the game you previously set-up with no possibility for changing, (switching to digital for example or changing the length of a round). If you say "no" to the question of continuing, the entire program is erased. There is no way for the program to switch from one type game to the other.

The digital game is just like the analog except that after entering the analog clock time, you must enter the time again in a digital form. This merely consists of learning to put a leading zero in front of single digit hours. For example, 1:10 becomes 01:10.

This program does not work well with children, particularly those who cannot yet read. It does not have interesting graphics, rewards, or goals. In short, there is very little to motivate or to hold the interest of a child. It is not particularly child friendly. It relies on reading ability or the close supervision of an adult. The wrong answer response is at least as much fun as the correct one if not more so, and sometimes correct answers are counted as wrong.

If you plan to teach your child to tell time yourself, and are looking for something to supplement your instruction, then this program may suit you. However, this is not a program that children will choose to play and it does not lend itself well to unsupervised play. I feel that this is not a true educational program and that it fails as a game. I cannot recommend this program.

(Tom Mix Software, 3424 College N.E., Grand Rapids, MI 49505, $14.95)

—James Ventling

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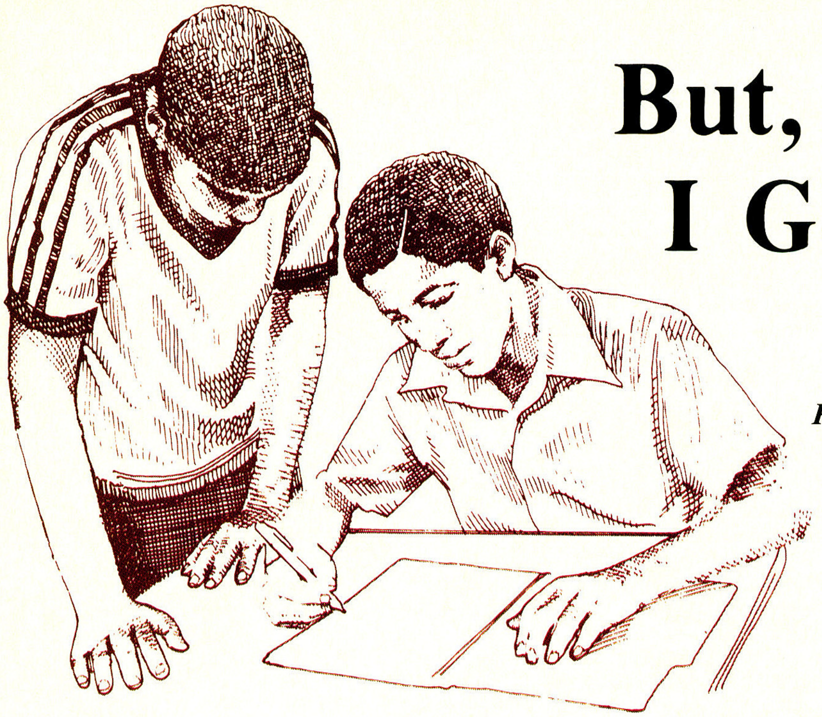

But, What Did I Get Wrong?

By Steve Blyn

***Rainbow* Contributing Editor**

You've got this great educational game going on your computer. It asks the child some questions in a particular category and everything appears fine. Let's check—the questions are coming up randomly. They are not repeating. You have appropriate reinforcers. Your counters and scorers are giving a correct final tally or score. What more could any kid want?

He may very well want to know which questions he got wrong. Many children cannot remember which questions they got right or wrong or maybe even which questions were asked in the first place. Sometimes children (and adults, too) get so caught up in the excitement of the program that they forget the questions and answers they have already gone through.

It's a good idea, often, to let the computer keep track of the incorrect answers and their accompanying questions. This is a good opportunity for the adult and child, or the child alone, to go over the incorrect answers and see where he went wrong. We don't want the child to merely keep playing the game until he memorizes all of the answers. We always hope for true understanding of the correct answer. A quick review of the wrong responses before proceeding to the next set of questions also acts as an extra incentive for the child to pay close attention to his answers.

Here is a short program to review the symbols for some of the most important of the chemical elements. The point of this program is that it demonstrates one easy way to use the computer to keep track of incorrect responses. If the child makes any mistakes, they are immediately saved by the program by the small array set up at lines 270-290. They are printed out at the end of each round by line 330.

This program will work on any of the CoCo models. The amount of data that you enter can be as large or as small as your needs and your computer's memory will allow. Be careful to have the "L" value on line 50 agree with the total number of your DATA pairs. Twenty-five chemical elements were used in our program merely as an example for you to key in.

This topic may or may not be suitable for your child. Feel free to enter any data that pertains to what he is currently studying that he wishes to review. If he is having difficulty, stay with him and go over the incorrect responses as they appear on the screen. As he gains confidence, let him work on his own. When he has mastered the set of questions, enter new data in the same subject area for additional review.

(Mr. Blyn, who teaches both exceptional and gifted children, holds two Master's degrees in the field of education and has won an award for the design of a computer program to aid handicapped children. He and his wife, Cheryl, own Computer Island.)

100	0179
290	035C
END	05D6

The listing:

```
10 REM"ELEMENTS"
20 'STEVE BLYN -COMPUTER ISLAND,
 NEW YORK-1983
30 CT=0 '***CT IS THE COUNTER
40 W=0  '***W IS THE # OF WRONG
EXAMPLES
50 L=25 '***L IS THE NUMBER OF D
ATA PAIRS. IF YOU ADD MORE DATA,
MERELY ADJUST THIS NUMBER TO MAT
CH.
60 DIMA$(L),B$(L)
70 FOR T=1TO L:READ A$(T),B$(T):
NEXTT
80 CLS:FORT=1024TO1119:POKET,207
```

```
:NEXT:PRINT@6,"elements and symb
ols";
90 CT=CT+1
100 IF CT>10 THEN 300
110 PRINT@67,"element";:PRINT@83
,"symbol";
120 R=RND(L)
130 A$=A$(R):B$=B$(R)
140 A$(R)=A$(L):B$(R)=B$(L):L=L-
1
150 PRINT@128,A$
160 PRINT@144,"";:INPUT C$
170 IF C$<>B$ THEN 210
180 IF C$=B$ THEN FORT=220TO255S
TEP5:SOUNDT,1:NEXTT
190 PRINT@320,CHR$(255);CHR$(255
);" YAY...PRESS ENTER TO GO ON";
:INPUT EN$
200 CLS:GOTO 80
210 PRINT@320,"SORRY,THE SYMBOL
IS ";B$
220 SOUND20,6:SOUND10,6
230 PRINT@386,"PRESS <ENTER> TO
GO ON";
240 W=W+1:'***# OF WRONG RESPONS
ES"
250 GOSUB 270
260 INPUT ENTER$:CLS:GOTO 80
270 'REMEMBER WRONG ANSWERS HERE
280 X$(W)=A$:Y$(W)=B$
290 RETURN
300 CLS:PRINT" HERE ARE YOUR REV
IEW EXAMPLES "
310 FOR T=1 TO 32:PRINTCHR$(204)
;:SOUND230,1:NEXT
320 IF W=0 THEN FOR T=50TO250STE
P10:SOUNDT,1:NEXT:PRINT" HURRAY,
 YOU MADE NO MISTAKES.":GOTO 370
330 FORT=1TOW:PRINTT;X$(T),Y$(T)
:NEXT :'***THIS IS WHERE THE WRO
NG EXAMPLES ARE PRINTED OUT.
340 DATA BROMINE,BR,CALCIUM,CA,C
ARBON,C,COPPER,CU,FLOURINE,F,GOL
D,AU,HYDROGEN,H,IODINE,I,IRON,FE
,LEAD,PB
350 DATA MAGNESIUM,MG,MANGANESE,
MN,MERCURY,HG,NICKEL,NI,NITROGEN
,N,OXYGEN,O,PHOSPHORUS,P,PLATINU
M,PT,POTASSIUM,K,SILVER,AG,SODIU
M,NA,SULPHUR,S,TIN,SN,URANIUM,U,
ZINC,ZN
360 PRINT:PRINT"YOUR SCORE WAS "
;10*(10-W);"%."
370 PRINT"WANT TO PLAY AGAIN (y/
n)";:INPUT EN$
380 IF LEFT$(EN$,1)="Y" THEN RUN
 ELSE 390
390 CLS:PRINT" BYE FOR NOW":END
```

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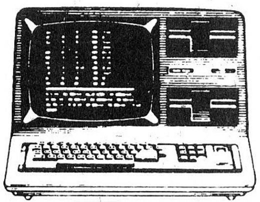

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JOE McMANUS

Homing In On A Guided Missile System

By John W. Fraysse, Jr.

FEATURES

*** High resolution four color graphics with random scenes**
*** Five levels of difficulty (three with maneuvering targets)**
*** Action graphics with joystick control**
*** Self explaining instructions**
*** All BASIC programming**

Cadet Trainer is an attempt (I hope a successful one) to simulate the two phases of a command guided weapon system. That is, lock-on (or target discrimination) and terminal homing. In this game, your weapon is a "photon torpedo." Playing *Cadet Trainer* may develop one's peripheral vision and eye-hand coordination.

The graphics are programmed to simulate the apparent growth of the target as the photon torpedo closes. Note that the player is guiding the torpedo from his fighter craft. The player is *not* the torpedo but is seeing the target through the "eyes" of the torpedo itself.

PROGRAMMING TECHNIQUES

Cadet Trainer is written in BASIC. The only so-called tricks are a *BREAK* key disable and the familiar speed up *POKE 65495,0* to achieve the speed I believe necessary to give good response to joystick inputs.

PROGRAM FUNCTION

Cadet Trainer's initial display identifies itself and its author while playing the Air Force theme song. Optional instructions follow if needed. One must then select the difficulty level (1-5) which will be discussed later. The program will then draw the various perspectives of the target and display a flashing cross on the largest perspective pin pointing your "aim point" on the target. Press the fire button to erase the screen and draw the sector of space in which the smallest image of the target will appear at random for only an extremely short period of time.

You are now in the lock-on phase of your mission. You must position your small orange cross-hair (with the right joystick) to within eight pixels of the target's last position and press the fire button to begin the homing phase. If you achieve this, your booster motor will fire, propelling your torpedo into space where the approaching target will appear first small then progressively larger. Remember you must now position your cross-hair on the correct part of the target—your aim point. After the largest image appears, you have approximately one second before you reach the target. This time gets reduced with the higher difficulty levels. After you have reached the target your simulated warhead explodes and your miss distance for that particular mission and aim point is displayed briefly. The program then displays the aim point for the next mission. A mission consists of one lock-on phase and one homing phase. Five missions complete one play cycle where your score is totalled. You may then replay and/or change the difficulty level or *BREAK* to exit. Your score for the entire play cycle is the sum of all your lock-on times plus your five "miss distances." Obviously, the lower the score the better. It should also be noted that the lock-on timer does not start until the first target image appears.

DIFFICULTY LEVELS

1) Targets appear every time a random number between 1-20 equals 2. Targets do not maneuver and final homing time is 1.8 seconds.

2) Targets appear every time a random number between 1-10 equals 2. Targets do not maneuver and final homing time is 1.6 seconds.

3) Targets appear every time a random number between 1-7 equals 2. Targets maneuver plus/minus 50 pixels in a predictable fashion. Final homing time is 1.4 seconds.

4) Targets appear every time a random number between 1-5 equals 2. Targets maneuver plus/minus 100 pixels in a predictable fashion. Final homing time is 1.2 seconds.

5) Targets appear every time a random number between 1-4 equals 2 (FAST!). Targets maneuver as much as plus/minus 100 pixels in a random fashion. Final homing time is 1.0 seconds.

HINTS

You may hold your button during the lock-on phase while trying to find the target. During homing the button is not used.

Try to keep the cross-hair slightly off the aim point to keep it from being lost in the target or background as your torpedo closes. Remember the target image grows. Try to anticipate your aim point's next position. Make your move to the aim point after the final (largest) image has appeared.

SCORING

SKILL LEVEL	YOUR SCORE/DIFFICULTY LEVEL
ACE	12
FIRST CLASS	15
SECOND CLASS	20
THIRD CLASS	25
ROOKIE	30
RE-READ INSTRUCTIONS!	40

PROGRAM LINE DESCRIPTION

10-30	**Credits**
40	**Subroutine which draws the smallest target image**

50	Subroutine which paints orange or blue in PMODE 4
60-80	Initial display (song, title, author, instructions?)
90-150	instructions
160-190	break key disable
200	dimension statements
210	initialize program—input difficulty level
220-240	random graphics background
250-330	target graphics
340	initial conditions for lock-on phase
350	initial conditions for homing phase
360-450	lock-on phase program loop
460-540	homing phase program loop
550	target "hit" display—sound—miss
560	increment mission counter—update running score (GOTO 250)
570	total score display—replay? (GOTO 210)

90	0306
200	0775
300	0D73
400	1218
END	1618

The listing:

```
10 'CADET TRAINER FOR 16K 80C BY
 JOHN FRAYSSE
20 'BOX 822 DAHLGREN VA.22448
30 GOTO60
40 CIRCLE(B,C),2,1,1:LINE(B-6,C+
1)-(B+6,C+1),PSET:PSET(B-8,C+1,1
):PSET(B+8,C+1,1):PSET(B+2,C-2,1
):PSET(B-2,C-2,1):RETURN
50 FOR II=0TO LN STEP2:LINE(B+II
,C)-(B+II,C+HT),PSET:NEXTII:RETU
RN
60 CLS0:POKE65495,0:FORI=0TO31ST
EP2:C=RND(7)+1:FORJ=0TO63:SET(J,
I,C):NEXTJ:NEXTI:POKE65494,0
70 PRINT@128,"          cadet tra
iner":PRINT@192,"          by john
 frayssе":PLAY"L8;A;O4;L16;C;L4;
C;O3;L16;B-;L16;A;L8;G;L4;A;L4;B
-;L4;B;O4;L4;C;L8;D;L16;F;L4;F;L
16;G;L16;F;L8;D;L4;C"
80 PRINT@288,"DO YOU NEED INSTRU
CTIONS(Y/N)";:INPUTZ$:IFZ$="N"TH
EN160
90 CLS:PRINT"YOU ARE A SPACE CAD
ET AT THE    ACADEMY. YOU ARE LE
ARNING TO USEYOUR PHOTON TORPEDO
S. YOUR GOAL IS TO LOCK YOUR TOR
PEDO ON AND  GUIDE IT WITH THE R
IGHT JOYSTICKTO A SPECIFIED PART
 OF THE      TARGET. THE FIRST D
```

Artwork By Jack Keller

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```
ISPLAY IS THETARGET ";
100 PRINT"WITH YOUR AIM POINT SH
OWNAS A  FLASHING CROSS. PRESS T
HE FIRE BUTTON TO DRAW YOUR DISP
LAYSCREEN. THE ENEMY CRAFT WILL
   APPEAR ONLY BRIEFLY DUE TO HI
S  CLOAKING DEVICE.":INPUT"PRESS
 <ENTER> TO CONTINUE";Z$
110 POKE65495,0:FORI=0TO31STEP2:
C=RND(7)+1:FORJ=0TO63:SET(J,I,C)
:SET(J,I+1,C):NEXTJ:NEXTI
120 CLS:PRINT"YOU MUST GET THE C
ROSS HAIR TO  WITHIN 8 PIXELS OF
 THE TARGET'S LAST POSITION TO A
CHIEVE A BOOSTINTO THE TARGET AR
EA. ONCE THIS HAS BEEN DONE YOU
MUST GUIDE THETORPEDO TO ITS MAR
K. YOUR SCORE IS THE TOTAL OF ";
130 PRINT"YOUR FIVE        LOCK-O
N TIMES AND YOUR MISS      DISTAN
CES. THE LOWER YOUR TOTAL THE BE
TTER. DIFFICULTLY LEVELS  (1-5)
INCREASE THE RATE AT WHICHTARGET
S APPEAR AND SHORTEN YOUR HOMING
 TIME. LEVELS ABOVE 2 HAVEMANUEV
ERING TARGETS. ";
140 PRINT"GOOD LUCK! PRESS <ENTE
R> TO START";:INPUTZ$
```

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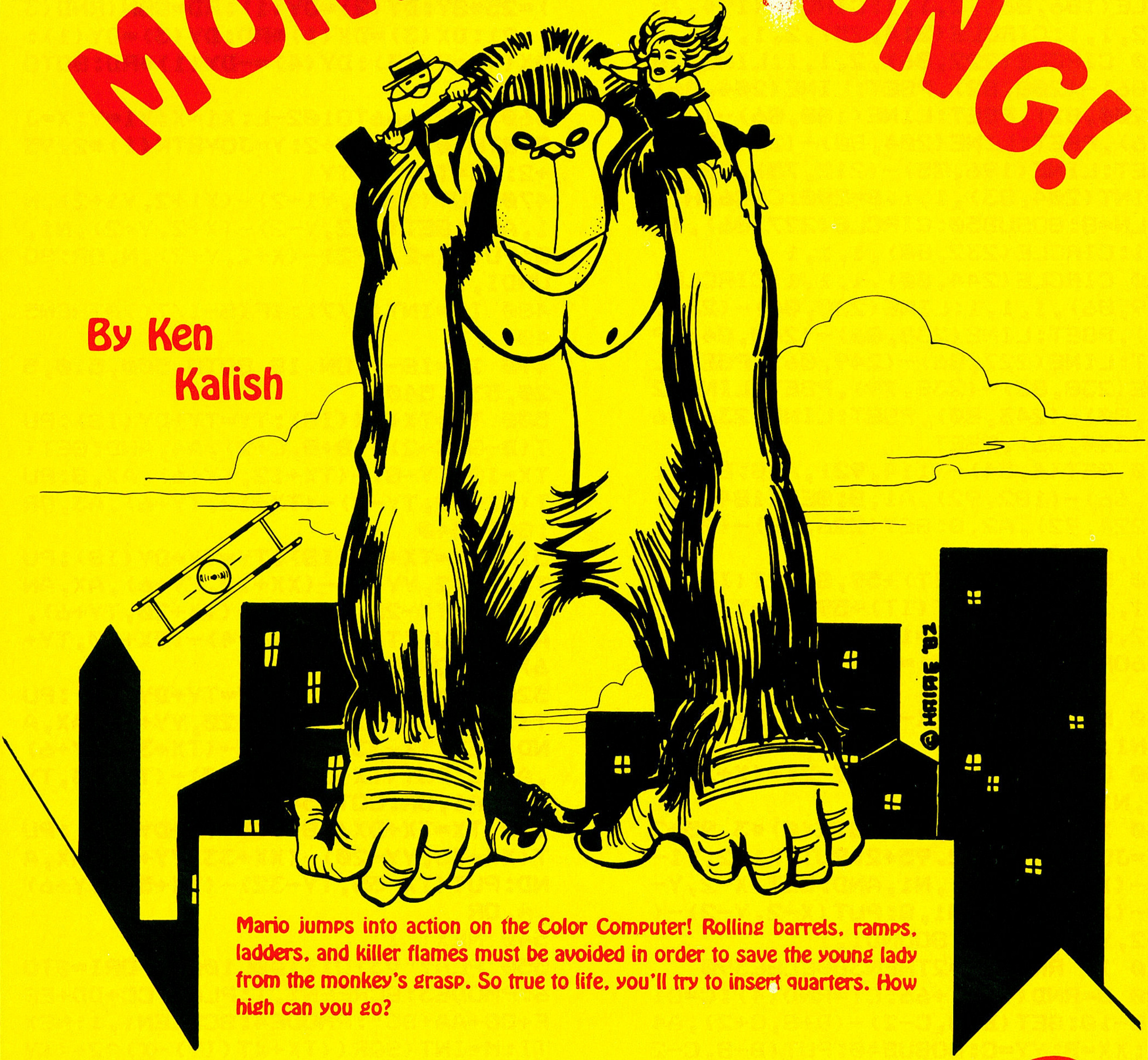
```
150 FORI=0TO31STEP2:C=RND(7)+1:F
ORJ=0TO63:SET(J,I,C):SET(J,I+1,C
):NEXTJ:NEXTI
160 IFPEEK(&H3EB9)<>&H32 THENCLE
AR200,&H3EB0:FORI=&H82B9 TO&H831
E:POKEI-&H4400,PEEK(I):NEXTELSE1
90
170 FORI=0TO2:POKE&H3EBD+I,18:NE
XT:I=&H3F1E
180 POKEI,&H26:POKEI+1,3:POKEI+2
,&H7E:POKEI+3,&H83:POKEI+4,&H22:
POKEI+5,&H7E:POKEI+6,&HA4:POKEI+
7,&H4C
190 POKE&H19B,&H3E:RUN200
200 CLEAR10:DIM N(1),N1(1),A(155
),AX(64),A1(64),A2(30),A3(13),XT
(4),YT(4),A4(10),DX(4),DY(4)
210 POKE65495,0:IT=0:MM=0:L=1:XT
(0)=0:XT(1)=50:XT(2)=20:XT(3)=-2
0:XT(4)=-50:YT(0)=0:YT(1)=0:YT(2
)=27:YT(3)=27:YT(4)=0:IT=0:IC=0:
CLS0:PRINT@225,"CADET TRAINER -"
;:INPUT"ENTER LEVEL";L:GOTO250
220 PCLS:LINE(3,55)-(7,55),PSET:
LINE(5,53)-(5,57),PSET:GET(3,53)
-(7,57),N,G:PCLS:FORI=0TO90:B=RN
D(252)+2:C=RND(189)+2:PSET(B,C,1
):NEXT I
230 FORI=0TO10:B=RND(245)+7:C=RN
D(180)+7:CIRCLE(B,C),RND(3)+1,1,
1:CIRCLE(B,C),RND(1)+1,1,1:NEXTI
:B=RND(220)+17:C=RND(165)+15:CIR
CLE(B,C),10,1,1:CIRCLE(B,C),15,1
,.25:CIRCLE(B,C),17,1,.25:B=B-7:
C=C-7:HT=2:LN=14:GOSUB50:B=B-3:C
=C+6:HT=2:LN=20
240 GOSUB50:B=B+3:C=C+6:HT=2:LN=
14:GOSUB50:X=RND(239)+8:Y=RND(17
6)+8:GOTO340
250 PMODE4,1:PCLS:SCREEN1,1:IFL<
1ORL>5THENL=1
260 CIRCLE(59,86),15,1,1,.5,1:CI
RCLE(149,86),9,1,1,.5,1:CIRCLE(2
04,86),6,1,1,.5,1:CIRCLE(9,86),5
,1,1:CIRCLE(109,86),5,1,1:CIRCLE
(9,86),3,1,1:CIRCLE(109,86),3,1,
1:CIRCLE(39,59),5,1,1:CIRCLE(79,
59),5,1,1:CIRCLE(39,59),3,1,1:CI
RCLE(79,59),3,1,1
270 LINE(49,76)-(59,86),PSET:LIN
E(59,86)-(69,76),PSET:LINE(14,85
)-(44,85),PSET:LINE(74,85)-(104,
85),PSET:LINE(14,87)-(104,87),PS
ET:LINE(58,71)-(58,54),PSET:LINE
(60,71)-(60,54),PSET:LINE(44,58)
-(74,58),PSET:LINE(44,60)-(74,60
),PSET:PAINT(59,80),1,1
280 PAINT(9,86),1,1:PAINT(109,86
),1,1:B=49:C=86:HT=5:LN=20:GOSUB
50:CIRCLE(119,86),3,1,1:CIRCLE(1
```

MONKEY KONG!

By Ken
Kalish



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```
34,69),3,1,1:CIRCLE(164,69),3,1,
1:CIRCLE(179,86),3,1,1:LINE(116,
86)-(176,86),PSET:LINE(149,86)-(
143,80),PSET:LINE(149,86)-(154,8
0),PSET
290 LINE(137,69)-(161,69),PSET:L
INE(149,77)-(149,66),PSET:CIRCLE
(119,86),1,1,1:CIRCLE(179,86),1,
1,1:CIRCLE(134,69),2,1,1:CIRCLE(
164,69),2,1,1:PAINT(149,82),1,1:
B=143:C=86:HT=3:LN=12:GOSUB50:CI
RCLE(186,86),2,1,1:CIRCLE(194,75
),2,1,1:CIRCLE(214,75),2,1,1
300 CIRCLE(222,86),2,1,1:LINE(20
4,86)-(208,82),PSET:LINE(204,86)
-(200,82),PSET:LINE(188,86)-(220
,86),PSET:LINE(204,80)-(204,73),
PSET:LINE(196,75)-(212,75),PSET:
PAINT(204,83),1,1:B=200:C=86:HT=
2:LN=8:GOSUB50:CIRCLE(227,86),1,
1,1:CIRCLE(232,80),1,1,1
310 CIRCLE(244,80),1,1,1:CIRCLE(
249,86),1,1,1:LINE(238,86)-(236,
84),PSET:LINE(238,86)-(240,84),P
SET:LINE(227,86)-(249,86),PSET:L
INE(238,83)-(238,79),PSET:LINE(2
33,80)-(243,80),PSET:LINE(236,86
)-(240,86),PSET
320 GET(4,54)-(114,92),A,G:GET(1
16,66)-(182,92),A1,G:GET(184,72)
-(224,92),A2,G:GET(226,78)-(250,
92),A3,G
330 CIRCLE(XT(IT)+59,86-YT(IT)),
2,1,1:CIRCLE(XT(IT)+59,86-YT(IT)
),2,0,1:TI=0:IC=1:IFPEEK(65280)=
126ORPEEK(65280)=254THEN220ELSE3
30
340 R=20/L:GET(X-2,Y-2)-(X+2,Y+2
),N1,G:GOTO360
350 GOSUB40:GET(X-2,Y-2)-(X+2,Y+
2),N1,G:GOTO460
360 X1=X:Y1=Y:X=JOYSTK(0)*3.95+2
:Y=JOYSTK(1)*2.95+2:PUT(X1-2,Y1-
2)-(X1+2,Y1+2),N1,AND:GET(X-2,Y-
2)-(X+2,Y+2),N1,G:PUT(X-2,Y-2)-(
X+2,Y+2),N,OR:SOUNDI,1
370 IF RND(R)=2THEN380ELSE390
380 B=RND(123)+66:C1=RND(4):C=C1
*48-10:GET(B-8,C-2)-(B+8,C+2),A4
,G:XX=B:YY=C:GOSUB40:PUT(B-8,C-2
)-(B+8,C+2),A4,AND:IF TI=0THEN T
IMER=0:TI=1
390 IFABS(X-B)<9ANDABS(Y-C)<9THE
N400ELSE360
400 P=PEEK(65280):IF  P=126ORP=2
54THEN410ELSE360
410 IC=2:MM=MM+INT(TIMER/60):PUT
(X-2,Y-2)-(X+2,Y+2),N1,AND:PLAY"
V31O1T100L100":FORI=0TO30:PMODE3
:SCREEN1,1:PLAY"CC+":PMODE4:SCRE
EN1,1:NEXTI:TX=B:TY=C:SX=SGN(128
-B):SY=SGN(96-C)
420 IFL<3THEN440ELSEIFL=5THEN450
ELSE430
430 FORI=1TO4:DX(I)=18*SX*L*L/16
:DY(I)=25*SY*L*L/16:NEXTI:GOTO35
0
440 FORI=1TO4:DX(I)=0:DY(I)=0:NE
XTI:GOTO350
450 DX(1)=18*SX:DX(2)=DX(1):DY(1
)=25*SY:DY(2)=DY(1):RD=SGN(RND(3
)-2):DX(3)=DX(1)*RD:DY(3)=DY(1):
DX(4)=DX(3):DY(4)=-DY(1)*RD:GOTO
350
460 FORI=66TO102-L:X1=X:Y1=Y:X=J
OYSTK(0)*3.95+2:Y=JOYSTK(1)*2.95
+2:XX=TX:YY=TY
470 PUT(X1-2,Y1-2)-(X1+2,Y1+2),N
1,AND:GET(X-2,Y-2)-(X+2,Y+2),N1,
G:PUT(X-2,Y-2)-(X+2,Y+2),N,OR:SO
UNDI,1
480 IS=INT(I/7):IFIS-I/7<>0THEN5
40
490 IS=IS-9:ON IS GOTO 500,510,5
20,530,540
500 TX=TX+DX(IS):TY=TY+DY(IS):PU
T(B-8,C-2)-(B+8,C+2),A4,AND:GET(
TX-12,TY-8)-(TX+12,TY+6),AX,G:PU
T(TX-12,TY-8)-(TX+12,TY+6),A3,OR
:GOTO540
510 TX=TX+DX(IS):TY=TY+DY(IS):PU
T(XX-12,YY-8)-(XX+12,YY+6),AX,AN
D:GET(TX-20,TY-14)-(TX+20,TY+6),
AX,G:PUT(TX-20,TY-14)-(TX+20,TY+
6),A2,OR:GOTO540
520 TX=TX+DX(IS):TY=TY+DY(IS):PU
T(XX-20,YY-14)-(XX+20,YY+6),AX,A
ND:GET(TX-33,TY-20)-(TX+33,TY+6)
,AX,G:PUT(TX-33,TY-20)-(TX+33,TY
+6),A1,OR:GOTO540
530 TX=TX+DX(IS):TY=TY+DY(IS):PU
T(XX-33,YY-20)-(XX+33,YY+6),AX,A
ND:PUT(TX-55,TY-32)-(TX+55,TY+6)
,A,OR
540 NEXT I
550 PLAY"V31O1T100L100":FORI=0TO
6:PMODE3:SCREEN1,1:PLAY"CC+DD+EF
F+GG+AA+BC":PMODE4:SCREEN1,1:NEX
TI:M=INT(SQR((TX+XT(IT)-X)^2+(TY
-YT(IT)-Y)^2)):CLS0:PRINT@256,"
       LEVEL=";L;"MISS=";M:FORI=
0TO2000:NEXT
560 IC=0:IT=IT+1:MM=MM+M:IFIT=5T
HEN570ELSE250
570 CLS0:PRINT@256,"        SCORE
=";MM;"LEVEL=";L:POKE65494,0:LIN
EINPUT"     PRESS <ENTER> TO REPL
AY?   ";Z$:GOTO210
```

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- **Embedded format and control codes**
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Simply stated, Telewriter is the most powerful word processor you can buy for the TRS-80 Color Computer. The original Telewriter has received rave reviews in every major Color Computer and TRS-80 magazine, as well as enthusiastic praise from thousands of satisfied owners. And rightly so.

The standard Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkerboard letters and tiny lines give you no feel for how your writing looks or reads. Telewriter gives the Color Computer a 51 column by 24 line screen display with *true lower case characters*. So a Telewriter screen looks like a printed page, with a good chunk of text on screen at one time. In fact, more on screen text than you'd get with Apple II, Atari, TI, Vic or TRS-80 Model III.

On top of that, the sophisticated Telewriter full-screen editor is so simple to use, it makes writing fun. With single-letter mnemonic commands, and menu-driven I/O and formatting, Telewriter surpasses all others for user friendliness and pure power.

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> *...one of the best programs for the Color Computer I have seen...*
> — Color Computer News, Jan. 1982

TELEWRITER-64

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64K COMPATIBLE

Telewriter-64 runs fully in any Color Computer — 16K, 32K, or 64K, with or without Extended Basic, with disk or cassette or both. It automatically configures itself to take optimum advantage of all available memory. That means that when you upgrade your memory, the Telewriter-64 text buffer grows accordingly. In a 64K cassette based system, for example, you get about 40K of memory to store text. So you don't need disk or FLEX to put all your 64K to work immediately.

64 COLUMNS (AND 85!)

Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64 × 24 and 85 × 24!! Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command.

The 51 × 24 display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, *all on the screen at one time*. Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple.

Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

FEATURES & SPECIFICATIONS:

Printing and formatting: Drives any printer (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminet, etc).

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dot-graphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

Supports single and multi-line headers and automatic centering. Print or save all or any section of the text buffer. Chain print any number of files from cassette or disk.

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File and I/O Features: ASCII format files — create and edit BASIC, Assembly, Pascal, and C programs, Smart Terminal files (for uploading or downloading), even text files from other word processors. Compatible with spelling checkers (like Spell 'n Fix).

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Read in, save, partial save, and append files with disk and/or cassette. For disk: print directory with free space to screen or printer, kill and rename files, set default drive. Easily customized to the number of drives in the system.

Editing features: Fast, full-screen editor with wordwrap, block copy, block move, block delete, line delete, global search and replace (or delete), wild card search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text; page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

Insert or delete text anywhere on the screen without changing "modes." This fast "free-form" editor provides maximum ease of use. Everything you do appears immediately on the screen in front of you. Commands require only a single key or a single key plus CLEAR.

> *...truly a state of the art word processor... outstanding in every respect.*
> — The RAINBOW, Jan. 1982

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Dumb Terminal Routine Is Pretty Smart Program

By Dan Downard

This month we will be discussing how the CoCo outputs a character on the screen. For the sake of using the existing BASIC subroutine for Machine Language programs, we will see how it operates. We will then develop our own character output routine for use with other computers. This routine is called *DMBTRM,* a shortened name for dumb terminal. What is a dumb terminal? A dumb terminal is simply a keyboard and display device that sends and receives (display) characters over a serial/RS-232 interface.

ROM Character Output Routine

If you were to disassemble the BASIC ROM from $A30A to $A35D and $A92D to $A936, you would get a listing similar to Listing 1. Comments have been added to explain the operation. As you can see, this routine is called with the character to be output in the A register. All registers are saved. This routine is called using direct addressing at $A30A or by indirect addressing at $A002, assuming $6F is set to 0. As you can see, any character less than $20 is ignored with two exceptions, $0D and $08, the ASCII symbols for carriage return and backspace, respectively. Three routines contained in this listing may be of some use:

$A30A output char. in a reg. to screen
$A34B scroll screen
$A92D

Any call to $A34B must be preceded with a PSHS A,B,X instruction to keep the stack organized. By this time, you should have figured out that the text screen starts at $400 and ends at $5FF. The position of the cursor is stored at location $88 and can be called the screen pointer of SCNPTR. This routine is fine for the majority of Machine Language programs and very convenient to use.

DMBTRM

While trying to use my Color Computer as a dumb terminal for another computer, the need arose to have full cursor control of the screen. The particular system I was dealing with used the following ASCII codes:

$0A (LF)	line feed
$0D (CR)	carriage return
$08 (BS)	backspace
$07 (BEL)	bell
$1A (SUB)	clear screen
$0C (FF)	cursor forward
$0B (VT)	cursor up

The program in Listing 2 is the result of this need. A similar program written for a 6801 processor in Motorola application note AN-798 was used as a guideline for this terminal. More elaborate programs are available on the marketplace that will do the same and much more but there is some satisfaction in writing and debugging your own program.

Description Of DMBTRM

Lines 140-190	ROM locations
Lines 190-450	Main timing loop/cursor blinking
Lines 460-740	Serial output
Lines 750-770	Scroll decision
Lines 780-1130	Serial input
Lines 1140-2140	Display char on screen

DMBTRM uses a non-destructive cursor, that is, the cursor does not erase the character as it moves. It operates at 300 baud and has proved to provide reliable operation with another 68XX computer using the Color Computer as a terminal. The listing is commented so you can pick out any of the major subroutines for use on your own customized terminal.

How To Input Your System

I realize that many readers are not familiar with machine code programming, so a short explanation of Listing 2 is in order. This program was written using the Radio Shack *EDTASM+* ROM Pac. The listing can be explained for a typical line as follows:

```
3000  8E  0600  00190  START  LDX  #$600
CLEAR LINE
```

Memory address: 3000
Machine code: 8E 0600
Line number: 00190
Symbol: START

Nemonic operator: LDX
Operand: #$600
Comments: CLEAR LINE

These different locations are called fields and fully explained in the *EDTASM+* manual. The reason I am describing the fields is to point out the different ways of inputting a Machine Language program.

Method #1—Put Machine Code In Memory

Using a Machine Language monitor such as *C-BUG, SIGMON, HUMBUG, Z-BUG*, etc., you would input this program by using the *MEMORY EXAMINE* command. Start at memory location $3000 and input column 2 until you reach memory location $3196.

Method #2—Use An Assembler

Using an Editor/Assembler such as *EDTASM+* or *SDS-80C*, input columns 3 through 6 as a file. For the *SDS-80C*, line numbers are optional so omit column 3. Column 7 is optional on all assemblers. After inputting the text file use the proper command to assemble the file and the assembler will put the program in memory for you.

Method #3—Poke Using BASIC

As in method #1, start at memory location $3000 and using *POKE* or *DATA* statements transfer the machine code into memory.

After you have put the code into memory be sure to save a copy to tape before running. It's a lot easier to find a mistake than to retype the entire code or file. The entry address is $3000 or *EXEC*&H3000 and *ENTER*.

Conclusion

As I mentioned before, there are many commercial software programs that perform this task (and probably do a better job). Refinements consist of buffers, variable baud rates and character formats, save and load buffers from tape or disk. They are very reasonable and well worth the investment. At the same time, much can be learned by doing it yourself.

The listing:

```
00100 *DUMB TERMINAL
00110 *DAN DOWNARD
00120 *REV 0    1/83
00130           ORG    $3000
00140 POLCAT    EQU    $A1C1   ROM CALLS
00150 CLS       EQU    $A928
00160 PIAO      EQU    $FF20
00170 PIAI      EQU    $FF22
00180 SOUND     EQU    $A948
00190 START     LDX    #$600   CLEAR LINE AFTER
00200           LDA    #$60    END OF SCREEN
00210           STA    CHR     FOR SCROLLING
00220 FILL      STA    ,X+
00230           CMPX   #$620
00240           BNE    FILL
00250           JSR    CLS
00260           LDX    #$400
00270 WRCUR     LDA    #$AF    PUT CURSOR
00280           STA    0,X     ON SCREEN
00290           BSR    TIMER
00300 ERCUR     LDA    CHR     PUT CHAR
00310           STA    0,X     ON SCREEN
00320           BSR    TIMER
00330           BRA    WRCUR
00340 TIMER     PSHS   X       CONTROL LOOP
00350           LDX    #$FF
00360 MORE      BRA    CHKC    KEYBOARD
00370 CONT      STX    TEMPX
00380           PULS   X
00390           BSR    SERTST  SERIAL IN
00400           PSHS   X
00410           LDX    TEMPX
00420           LEAX   -1,X
00430           BNE    MORE
00440           PULS   X
00450           RTS
00460 CHKC      JSR    POLCAT  KEY PRESSED?
00470           BNE    OUT
00480           BRA    CONT
00490 OUT       PULS   X       SEND IT
00500           PSHS   A,B,X,CC
00510           ORCC   #$50
00520           BSR    OUT2
00530           CLRB
00540           BSR    OUT3
00550           LDB    #$08
00560 OUT1      PSHS   B
00570           CLRB
00580           LSRA
00590           ROLB
00600           ASLB
00610           BSR    OUT3
00620           PULS   B
```

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```
00630        DECB
00640        BNE   OUT1
00650        BSR   OUT2
00660        PULS  A,B,X,CC
00670        BRA   TIMER
00680 OUT2   LDB   #$02
00690 OUT3   STB   PIAO
00700        BSR   OUT4
00710 OUT4   LDX   #$BE
00720 OUT5   LEAX  -1,X
00730        BNE   OUT5
00740        RTS
00750 ENDSCN CMPX  #$600   SCROLL?
00760        LBGE  SCROL
00770        RTS
00780 SERTST LDB   PIAI    SERIAL INPUT?
00790        ASRB
00800        BCC   INCH
00810        RTS
00820 INCH   PSHS  X,B,CC  INPUT CHAR
00830        ORCC  #$50
00840 INCH1  LDA   PIAI
00850        ASRA
00860        BCS   INCH1
00870        BSR   WAITH
00880        LDA   PIAI
00890        ASRA
00900        BCS   INCH1
00910        CLRA
00920        PSHS  A
00930        LDB   #$7
00940 INCH2  BSR   WAIT1
```

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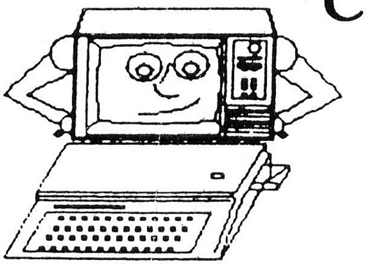
```
00950        LDA   PIAI
00960        NOP
00970        ASRA
00980        ROR   0,S
00990        DECB
01000        BNE   INCH2
01010        BSR   WAIT2
01020        PULS  A
01030        LSRA
01040        PULS  B,X,CC
01050        BSR   SER
01060        BSR   ENDSCN
01070        RTS
01080 WAIT2  BSR   WAIT1
01090 WAIT1  BSR   WAITH
01100 WAITH  LDX   #$B6
01110 WAIT   LEAX  -1,X
01120        BNE   WAIT
01130        RTS
01140 SER    ANDA  #$7F    DISPLAY CHAR
01150        PSHS  A
01160        ANDA  #$60    CNTL CHAR?
01170        BEQ   CNTRL
01180        PULS  A
01190        CMPA  #$40
01200        BGE   SER1
01210        ORA   #$40
01220 SER1   STA   0,X     STORE CHAR
01230        LEAX  1,X     ON SCREEN
01240        BRA   SAND
01250 CNTRL  PULS  A
01260        CMPA  #$0A    LINE FEED?
01270        BEQ   LINEF
01280        CMPA  #$0D    CARRIAGE RETURN?
01290        BEQ   CARRET
01300        CMPA  #$08    BACKSPACE?
01310        BEQ   BACKSP
01320        CMPA  #$07    BELL?
01330        BNE   CLRSCR
01340        JMP   SOUND
01350 CLRSCR CMPA  #$1A    CLR SCREEN?
01360        BNE   MORECH
01370        LDB   #$60
01380        STB   CHR
01390        JSR   CLS
01400        LDX   #$400
01410        RTS
01420 MORECH CMPA  #$0C    FWD CURSOR?
01430        BEQ   FWDC
01440        CMPA  #$0B    UP CURSOR?
01450        BEQ   UPCUR
01460        RTS
01470 LINEF  LDB   CHR     LINE FEED
01480        STB   0,X
01490        LEAX  32,X
01500        STX   TEMPX
01510        CMPX  #$600
01520        BNE   SAND
01530        BSR   SCROL
01540        LDD   TEMPX
```

INTERNATIONAL COLOR COMPUTER CLUB



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1). FREE PROGRAMS.	Good programs written by our members are contained in the library, in the newsletter, and on the new member tape.
2). NEWSLETTER.	A "magazine" sized newsletter (last issue 80 pages), with programs, tips data, reviews, articles and much more.
3). NEWSLETTER Tape	A tape of all the programs appearing in the newsletter is available from the library for $2.00 (to members)
4). CLUB LIBRARY.	The club maintains a library of programs, books and Radio Shack ROM-packs. The programs are member written and are yours to keep, there is a small fee to cover postage and tape ($2.). The books and ROMpacks may be checked out for 3 weeks at a time. (extencions possible)
5). DISCOUNTS.	get large discounts on many software and hardware items for CoCo from some of the MAJOR companies. Also discounts on subscriptions to the RAINBOW, CCN and Chromasette magazines.
6). ADVERTISE FREE	Members may place ads of up to ¼ page per issue in the newsletter FREE. (The ad must be computer related)
7). BORROW PARTS.	Don't wait weeks for the parts to come in from Radio Shack! Just check them out of the Clubs Parts library and return when yours arrive.
8). SURPRISE.	You receive a "New member" package containing many useful items.
9). GET HELP.	This is the worlds largest Color Computer Club. With members in almost every field of expertise. So if you have a problem with the Color Computer, we can almost always get you the answer. Put your problem on the Clubs Bulletin Board, write, or call.
10). FIND FRIENDS	As a new member, you will receive a list of the members in your area whom you may contact for CoCo talk.

HOW TO BECOME A MEMBER:

Write to the club for an application, there are no conditions for membership other than agreeing to obey the rules, being interested and paying the dues. The membership dues are $30.00 per year and we believe you get more than your moneys worth. You can save more than the $30.00 in discounts the club offers you. Example: Subscription to the RAINBOW, 25% off of regular subscription rates. Some members have told me that the new member tape alone is worth the $ 30. it contains 10, very good programs. Some of the programs contained in the library are, Accounts Receiveable, General ledger, Inventory, Sales file and ticket program with automatic Inventory update (for 32 K with 2 disc.)

VISA MasterCard

```
01550        ANDB   #$1F
01560        ABX
01570        RTS
01580 CARRET LDB    CHR     CARRIAGE
01590        STB    0,X     RETURN
01600 MAS5   CMPX   #$400
01610        BNE    MAS3
01620 SAND   LDB    0,X
01630        STB    CHR
01640        RTS
01650 MAS3   PSHS   X
01660        STX    TEMPX
01670        LDD    TEMPX
01680        ANDB   #$1F
01690        BNE    MAS4
01700        PULS   X
01710        BRA    SAND
01720 MAS4   PULS   X
01730        LEAX   -1,X
01740        BRA    MAS5
01750 SCROL  LDB    #$60
01760        STB    CHR
01770        JSR    SCROLL
01780        RTS
01790 BACKSP CMPX   #$400   BACKSPACE
01800        BNE    MAS2
01810        RTS
01820 MAS2   LDB    CHR
01830        STB    0,X
01840        LEAX   -1,X
01850        BRA    SAND
01860 FWDC   LDB    CHR     FORWARD
01870        STB    0,X     CURSOR
01880        CMPX   #$5FF
01890        BNE    MAS6
01900        JSR    SCROLL
01910        LEAX   -1,X
01920 MAS6   LEAX   1,X
01930        BRA    SAND
01940 UPCUR  LDB    CHR     UP CURSOR
01950        STB    0,X
01960        LEAX   -32,X
01970        CMPX   #$400
01980        BLT    LIMIT
01990        BRA    SAND
02000 LIMIT  LEAX   32,X
02010        BRA    SAND
02020 SCROLL STX    TEMPX   SCROLL
02030        LDX    #$400
02040 NOTYET LDA    32,X
02050        STA    ,X+
02060        CMPX   #$600
02070        BNE    NOTYET
02080        LDX    TEMPX
02090        LEAX   -32,X
02100        RTS
02110 CHR    RMB    1       CHARACTER
02120 TEMPX  RMB    2       X-REGISTER
02130        END    START
```

GRAPHICS

Son Of Graphic Traffic

One of our favorite program quickies is the five-liner sent in to us by John Dana of Hamden, Connecticut. It appeared in our December 1982, issue under the title of *Graphic Traffic*. Now John has created *Graphic Traffic II: Color Craziness*. It's a great simulation of a CoCo that's blown its cool.

John added color by adding just two lines to his December version—lines 8 and 15—and by changing line 5 from *CLEAR 100* to *CLEAR 600*. If you missed the earlier version, just key in the lines below and *RUN* it, then hit *ENTER* twice and then a few keys, for instance, your name, for the old verson. Hit the space bar several times and watch what happens.

For the color madness, *RUN* the program again, but this time enter a number (96 or above for full color—color only), and then hit *ENTER*. Now, each key on the keyboard, including the shift/zero mode, becomes a color key.

What happens is that the value you input is added to the ASCII value of the key you hit, and the character on the screen has the new ASCII number (the sum of the two values).

Careful: if the sum is greater than 255, you'll get an error code.

The effects are seemingly endless and, when you find a combination you like, you can preserve it in string or data statements—if you can remember what you did. At *Rainbow*, we find it's fun just in itself, but you could add it as a subroutine in a game program you're working on, too.

If things get a bit dizzying, particularly in the December version, add in a line somewhere, say line 35, that reads:35 FOR X=1 TO 8: NEXT X (a *FOR-NEXT* loop for time delay). Increase "8" to a larger number for a longer pause.

Here's the listing:

```
1 'COLOR CRAZINESS
5 CLEAR 600
8 INPUT N
10 A$=INKEY$
15 IF A$<>""THEN A$=CHR$(ASC(A$)
+N)
20 B$=B$+A$
30 PRINT B$;
40 GOTO 10
```

LISTEN UP

So, you've got an IO error on the first save of your favorite program, and you can't remember how far in the second save is. What to do? Just keep typing *CLOAD* until the second save finally comes up? Steve Lipps of Circle City Software has a better idea. If you put a little space between your saves, as many of us do, then you can listen for the second save. Says Steve, "Just use *AUDIO ON* and *MOTOR ON* and listen for the silent space. Then you can use *MOTOR OFF*. Even faster than *MOTOR OFF* is to hit any key and then *ENTER*, creating a syntax error which will stop the recorder." Then *CLOAD* the second save.

NEW!

- **ROML — ROM PAK Loader**
  - Save your ROM PAKs (or ANY machine language program) on disk then load and execute with ROML.
  - You no longer need to remove your disk controller to execute your ROM PAK software!
  - Also allows you to load from disk or tape and execute all machine language programs which are incompatible with the disk system!
  - Includes a utility to copy non-protected tapes to disk.
  - Note—ROM PAK execution requires good 64K RAM system.
  - Copy of article included describing how to access 64K RAM.

  Tape: $25.00 Disk: $29.00

NEW!

- **PLUS32**
  - Unleash the hidden 32K RAM in your 64K system.
  - Runs ROM BASIC from RAM where you can modify it!
  - Will not crash system if upper 32K is defective or not available.
  - Note—Requires good 64K RAM system.

  Tape: $15.00 Disk: $19.00

NEW!

- **ROMKIL — BASIC ROM disable routine**
  - Your choice:
    - Disables DISK BASIC ROM—returning your system to EXTENDED BASIC, or
    - Disables EXTENDED BASIC ROM—returning your system COLOR BASIC.
  - Frees up extra RAM.
  - System stays in the level of BASIC you select even if you press the Reset switch.
  - Turning power off and on returns system to original configuration.
  - Allows disk-incompatible machine language programs to be loaded and executed from tape without removing the disk controller.

  Tape: $15.00 Disk: $19.00

NEW!

- **BANNER**
  - Make your TV a moving Marquee with Color BANNER!
  - Enter any message and have it move across the screen in GIANT letters in the colors of your choice.
  - Control speed, delay and pause from within your message!
  - Great for parties and exhibitions!

  Tape: $19.00 Disk: $23.00

FUN!

- **PAC ATTACK — from Computerware**
  - The most popular game for the Color Computer!
  - Fast action and brilliant colors!
  - All the fun of the Arcade without the quarters!

  Tape: $24.95

BEST!

- **Nelson's SUPER "COLOR" WRITER II**
  - By far the BEST word processor available for the Color Computer!
  - More Features than any other.
  - Supports ANY line printer!
  - Excellent quality documentation!

  ROM PAK: $74.95 Disk: $99.95

WOW!

- **LCA-47 — Lower Case Adapter**
  - Provides real lowercase letters with true descenders!
  - Compatible with ALL Color Computer Software!
  - Provides bright characters on a dark background!
  - Superb User's Manual included.
  - Easy 5 minute installation!
  - Uses NO system memory!
  - 1 year warranty.
  - Hundreds of owners, all happy!

  Assembled and Tested: $75.00

SAVE!

- **SPECIAL — Save $25.00 when you purchase Super "Color" Writer II and an LCA-47 at the same time! Order NOW!**

GOOD!

- **PP-16 — EPROM Programmer**
  - Programs single supply 2516, 2716, and 2758 EPROMs.
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  - Comprehensive documentation booklet contains schematic, instructions for construction, check-out and use, and a well commented assembly listing for the specified MPU.
  - Note—User must supply the specified parallel interface.
  - Specify MPU and computer system when ordering.

  Complete Kit (includes ZIF socket): $45.00
  PC board only (with documentation): $25.00

```
==         ==  ========  ======
===       ===  ========  =======
====   ====      ==      ==   ==
==  ====  ==     ==      =======
==   ==   ==     ==      ======
==        ==     ==      ==
==        ==     ==      == INC.
```

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From Way Up And Way Over Here's *J/K Draw*

Program by Aaron Franksen

As you might expect, when we get mail from Cleveland, we don't rush to the road atlas to see if it's the largest city in Ohio. On the other hand, when we get a cute little program sent to us from Revelstoke, British Columbia, it's reach for the World Book time.

Aaron Fransen lives in this westernmost province of Canada and we like to think he uses his CoCo in the seclusion of a small cabin in the Monashee Mountains near Glacier National Park. There's probably a deer grazing in the meadow just outside his window, and maybe he uses his CoCo to plot the migratory patterns of wild geese. He's probably snowed in for the winter and will have his next issue of *the Rainbow* delivered by dogsled.

Yeah, that's what we like to think. Aaron, if you're the manager of the local McDonald's and drive a Dodge, just don't tell us, okay?

More than anything else, what does set Aaron apart from most of our contributors is that he's developed a program in non-Extended BASIC. We agree with him that more programs are needed that do not require ECB.

J/K Draw uses both the right joystick and the arrow keys to draw block graphics pictures on the low resolution screen. Once you've completed a masterpiece, you can save it to tape, too.

Writes Aaron, "I have found that young children enjoy this program a lot when they get the hang of it." Some of us who aren't children, but who treasure and cling to those childlike qualities we still manage to possess, *like J/K Draw*, too. The colors are brilliant and clean. Doodling with *J/K Draw* is sort of like playing around with Magic Markers, those felt pens with the wide tips. We tried our hand at drawing a little cabin in the woods.

Now a LOGO for the
COLOR COMPUTER

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TINY TURTLE is an affordable, fully compatible LOGO language with high resolution turtle graphics, music, fast processor operation, and storing and retrieval of user procedures. TINY TURTLE comes complete with soft-copy reference user manual.

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300	0260
500	03EF
750	070D
END	0A7A

The listing:

```
10 CLS:PRINT"     JOYSTICK/KEYBOA
RD DRAW":PRINT:INPUT"  DO YOU NE
ED INSTRUCTIONS";DY$
20 IF DY$="Y"THEN560
30 X=31:Y=15:C=6
40 POKE 65495,0
50 J=1
60 CLS0
70 IFPEEK(341)=247THENY=Y-1
80 IFPEEK(342)=247THENY=Y+1
90 IFPEEK(343)=247THENX=X-1
100 IFPEEK(344)=247THENX=X+1
110 IFINKEY$="S"THEN 470
120 IFX<0THENX=0
130 IFX>63THENX=63
140 IFY<2THENY=2
150 IFY>31THENY=31
160 IFPEEK(339)=239THENC=1
170 IFPEEK(340)=239THENC=2
180 IFPEEK(341)=239THENC=3
190 IFPEEK(342)=239THENC=4
200 IFPEEK(343)=239THENC=5
210 IFPEEK(344)=239THENC=6
220 IFPEEK(345)=239THENC=7
230 IFPEEK(338)=223THENC=8
240 IFPEEK(338)=239THENC=0
250 IFPEEK(340)=253THENJK=1
260 IFINKEY$="L"THEN520
270 IFPEEK(339)=191ORPEEK(341)=2
54THENCLS0
280 IFC=0THENRESET(A1,S1)
290 SET(X,Y,C)
300 A1=X:S1=Y
310 PRINT@0,"HORIZONTAL:";X," VE
RTICAL :";Y
320 IFPEEK(340)=251THEN420
330 IFJK=1THEN350
340 GOTO70
350 H=JOYSTK(0):V=JOYSTK(1)
360 IFH<20THENX=X-1
370 IFH>40THENX=X+1
380 IFV<20THENY=Y-1
390 IFV>40THENY=Y+1
400 IFPEEK(341)=253THEN JK=9
410 GOTO110
420 PRINT@0,"
               ";
430 PRINT@0,"RELOCATION OF DOT";
440 RESET(X,Y)
450 INPUT X,Y
460 GOTO70
```

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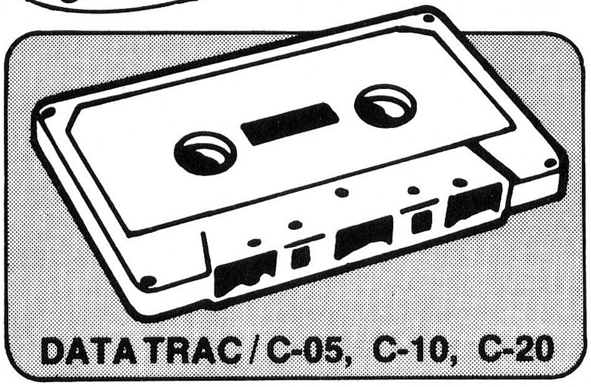

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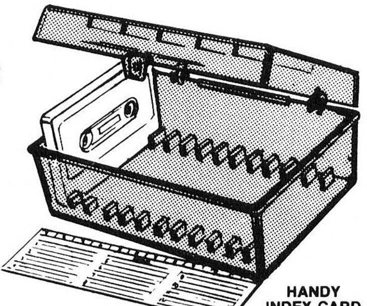

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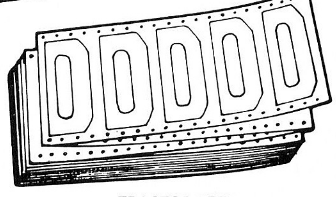

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```
470 POKE65494,0
480 MOTORON
490 FORDL=33TO255:PRINT@0,CHR$(D
L);:FORD2=0TO5:NEXTD2:NEXTDL
500 CSAVEM"DRAWINGS",1056,1535,4
0999
510 SOUND1,1:GOTO70
520 POKE65494,0
530 PRINT@0,"loading";
540 CLOADM"DRAWINGS"
550 SOUND5,1:GOTO70
560 CLS
570 PRINT"    JOYSTICK/KEYBOARD
DRAW"
580 PRINT"         BY AARON FRANSE
N"
590 PRINT:PRINT" THIS IS A DRAWI
NG PROGRAM"
600 PRINT" WHICH UTILIZES THE KE
YBOARD"
610 PRINT" OR THE JOYSTICK TO MO
VE A"
620 PRINT" COLORED DOT AROUND TH
E "
630 PRINT" SCREEN."
640 PRINT:PRINT" \\PRESS ANY KEY
 TO CONTINUE//"
650 IF INKEY$=""THEN650
660 CLS
670 PRINT" HERE IS A LIST"
680 PRINT" OF THE COMMANDS :"
690 PRINT:PRINT" ARROW KEYS -- M
OVE DOT IN                     D
IRECTION OF                    A
RROW."
700 PRINT" 'S' KEY     -- SAVES D
RAWING                 TO TAPE
."
710 PRINT" 'L' KEY     -- LOADS D
RAWING                 FROM TA
PE."
720 PRINT" NO.0 TO 8   -- CHANGES
 COLOUR                OF DOT.
'0'IS                  'BLACKO
UT'DOT."
730 PRINT:PRINT" \\PRESS ANY KEY
 TO CONTINUE//"
740 IFINKEY$=""THEN740
750 CLS
760 PRINT:PRINT" 'J' KEY     -- C
HANGES CONTROL                 O
F THE DOT TO                   T
HE JOYSTICK."
770 PRINT" 'K' KEY     -- CHANGES
 CONTROL               OF THE
DOT TO                 THE ARR
OW KEYS."
780 PRINT" clear KEY   -- CLEARS
SCREEN."
790 PRINT" FIRE BUTTON-- CLEARS
SCREEN."
800 PRINT:PRINT" THE HORIZONTAL
AND VERTICAL    LOCATIONS ARE P
RINTED AT THE   TOP OF THE SCRE
EN."
810 PRINT:PRINT" \\PRESS ANY KEY
 TO CONTINUE//"
820 IFINKEY$=""THEN820
830 CLS
840 PRINT
850 PRINT" YOU WILL REQUIRE A BL
ANK TAPE   TO SAVE THE DRAWN PIC
TURE TO    TAPE. WHEN YOU PRESS
THE 'S'    KEY, HOLD ON IT UNTIL
 YOU SEE   CHARACTERS BEING GENE
RATED      AT THE TOP LEFT OF TH
E SCREEN."
860 PRINT:PRINT" THE PROGRAM USE
S 64 BY 32      LOW RESOLUTION
GRAPHICS,       ALTHOUGH THE CO
LOURS CAN       BE QUITE DAZZLI
NG AND REAL-    ISTIC."
870 PRINT" 'R' KEY -- RELOCATES
DOT."
880 PRINT"   ++PRESS ANY KEY TO
BEGIN++"
890 IFINKEY$=""THEN890
900 GOTO30
```

Back Issue Availability

Back copies of many issues of *the RAINBOW* are still available.

All back issues sell for the single issue cover price—which is $2 for copies of Volume I, Numbers 1-8 (through February, 1982), $2.50 for Volume I, Numbers 9, 10 and 12 (through June except May, 1982) and $2.95 for those issues thereafter. In addition, there is a $3.50 charge *per order* for postage and handling if sent by United Parcel Service and $6 for orders sent U.S. Mail. UPS *will not* deliver to a post office box or to another country. This charge applies whether you want one back issue or all of them.

Most back issues are available on white paper in a reprint form. Issues out of print include May, July, August, September, October, November,and December, 1982 and January, February, 1983. VISA, MasterCard and American Express accepted. Kentucky residents please add 5 percent state sales tax.

Due to heavy demand, we suggest you order back issues you want now while supplies last.

In addition, copies of the cover *only* of the July, 1982, Anniversary Issue are available separately for $1 each, plus 50 cents shipping and handling. These are suitable for framing.

JUST GOOD SOFTWARE

*RAINBOW REVIEW DATES

DISK DOUBLE ENTRY - If you have spent hours trying to balance your Debits and Credits, this program is for you! Designed for small business, club, and personal use. Enter transactions in a journal type format. Program will maintain current account balances, produce Trial Balance, Income, and Balance Sheet reports and complete Account Ledgers. Will handle up to 300 accounts including report headings and totals. Up to 1400 average transactions on a diskette. Summary reports and four levels of subtotals available. REQUIRES 32K and a user understanding of standard double entry accounting concepts. – $44.95 in BASIC with Machine Language subroutines.

*JAN '83

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Software Review...

Remote Interest Quickens with *Remoterm*

What do you do on your lunch hour? Well, depending on how much time you have, or maybe depending on whether you have a terminal at your disposal, you can talk to your CoCo at home. Star-Kits has come up with another gem of a program in *Remoterm*. This program allows you to control and run your TRS-80C from a remote terminal or a modem.

Remoterm comes on cassette or disk. More than adequate information on its proper operation is given in the 10-page manual. To summarize, after loading the program at the memory location of your choice, it's in position independent code—the TRS-80C is controlled by both the keyboard and the RS-232 port. At the same time all output goes to the screen and the RS-232 port. The program is written in machine code and will run in 4K, although 16K is recommended. Operation is at 300 baud; higher baud rates are mentioned but not recommended.

Well, I guess you're thinking along the same lines as I was: this is great, but there are limitations. As the manual explains, during remote operation there is no way to hit the reset key for a hung-up program. A control-C from the remote terminal will simulate the break key. Maybe the modem you are using has this facility but be careful. The other problem was discovered quite by accident. I was using a terminal in the same room and tried to load a machine language program from tape. It just so happened that the program was at the same address as *Remoterm* and completely wiped it out, hanging-up the computer. My mistake, but something to remember.

There are several other uses for this program besides remote operation of the computer. Those of you who prefer a professional keyboard while using a word processor will find *Remoterm* the answer. For the same reasons, you may want a screen display different than 32 x 16, even though some other software is available for this purpose. Obviously, no graphic screens are available on the remote terminal and care must be exercised with program selection as various graphic commands will not work through a serial interface.

In summary, I recommend *Remoterm* to anyone interested in remote operation of the CoCo, for whatever purpose. The program does exactly what it is supposed to do. The documentation is excellent, complete with a commented listing of the source code. I would recommend that if remote operation is contemplated, a disk system is almost a necessity due to the mechanics of tape files. I found the program both interesting and valuable.

(Star-Kits, P.O. Box 290-R, Mt. Kisco, NY 10549, $19.95 on tape or disk)

—Dan Downard

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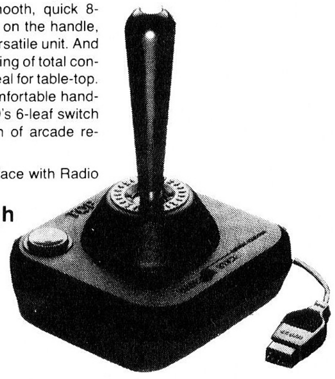

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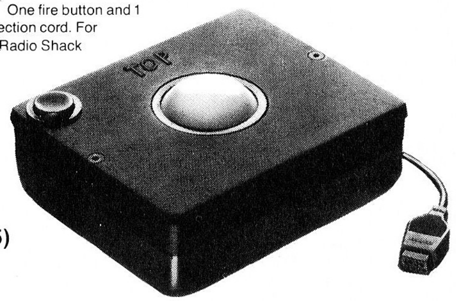

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Software Review...

Preread Series is Good Head Start Program

If you have a young child you would like to see receive a head start in reading, *Preread* by Prickly-Pear Software is an excellent tool with which to begin. Three programs are contained in the *Preread* package. They can teach the young child from three years up important letter recognition.

Preread 1 presents the names of the letters of the alphabet auditorially (by voice on tape) and asks the learner to press the letter on the keyboard which corresponds with the letter name. The voice is pleasant and nonthreatening.

Preread 2 presents the sounds of the letters of the alphabet in the context of words and asks the learner to press the key which corresponds to the sound which that letter makes. Vowel sounds are short and those letters (such as c and g) which have two sounds are prompted with the "hard" sounds. The letter"X" is presented as the "K" sound at the end of the word "box." The Q sound is presented as the first of the two letters at the beginning of the word "quiet." The sounds are presented out of sequence.

Preread 3 flashes random letters visually at the rate of one-fourth, one-half, or one full second. This rate is preselected. The learner is then to respond by pressing the correct key which corresponds to the letter he or she has just viewed on the screen. You select the number of letters you want the learner to view.

If the learner presses the correct key in any program, a Happy Face appears on the screen. Next the correct letter is graphically presented in both upper and lower case.

In *Preread 1 and 2*, an incorrect key press brings a Sad Face to the screen. Next, the correct letter is graphically presented on the screen. This flashes three times while the sound which accompanies a correct response is repeated. Another sound is used when an incorrect response is given; this allows the parent or teacher to auditorially monitor the learner's progress.

In *Preread 3*, an incorrect response is followed by the same Sad Face, but the letter is repeated until the learner makes the correct response.

The *Preread* package is an excellent group of programs, which a child of three years up to age six would benefit from. It is well documented, with the exception of loading procedures, which should be separated from the text. My son, a kindergartner, thoroughly enjoyed all three programs. They keep the child's interest and are viewed as a game, not a test, although a percentage score is given at the end of each program.

All programs give the learner unlimited time to find the letter asked for, but the original question is not repeated, thus encouraging the child to develop good listening and attention spans.

One addtional comment—several of the letter shapes, V and W especially, were confusing to the young learner.

(Prickly-Pear Software, 9822 E. Stella Road, Tucson, AZ 85701, $24.95)

—Pamela Peitsch

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Inspector Clueseau Is Not Elementary, Sherlock

Inspector Clueseau is a mystery game that would tax the deductive reasoning power of Sherlock Holmes. Mr. Goodbody has been murdered and you must solve the mystery. You must discover who committed the murder, the weapon used and in what room the crime occurred. Solving the mystery will not be easy because there are six suspects, eight possible weapons and nine rooms in the mansion.

You will have seventy-five game turns to solve the mystery. Each game turn will randomly place you in a room of the mansion with one randomly selected suspect. A hi-res graphic display will show your location in the mansion. You will have a choice of questioning the suspect, searching for a secret passage, or making an accusation.

Most of the information used to solve the mystery will be derived from questioning the six suspects. You can't trust all of the suspects! Miss Violet might lie or change her mind and Mr. Denton lies all the time.

Each game will have one randomly selected room with a secret passage. Upon entering a new room, search for the secret passage. If you are in the correct room, a secret door will open allowing you to enter a hidden chamber. You will be given a four letter code to solve. If you successfully solve the code within the allotted ten tries you will receive a CLUE or the message "Clues are getting scarce—try again." You will be returned to the game board after ten unsuccessful tries. One game turn is used each time you search for the secret passage.

You only have one chance to make a correct accusation. If you are wrong you will be given the correct suspect, weapon and room.

The instructions are clearly written and accurate. *Inspector Clueseau* is easy to play, but not necessarily easy to win. Hi-res graphics are used throughout most of the game. I especially liked the use of the hi-res alphanumerics. My wife enjoyed the secret door graphic and sound routines.

Inspector Clueseau uses the Auto Run program (copyright Sugar Software). There are some *POKE 65495,0* and *POKE 65494,0* commands used in the program to speed up and slow down computer operation. The speed up command can't be handled by some CoCo's. The Auto Run program prohibits the editing of the *POKE 65495,0* statements. A version of *Inspector Clueseau* could be sold without the speed up *POKE* statements.

Anyone who enjoys adventure or mystery games will have lots of fun playing *Inspector Clueseau.* This game will fine tune your deductive reasoning skills.

(Petrocci Freelance Associates, 651 N. Houghton Rd., Tucson, AZ 85710, $19.95 32K ECB tape only)

—Gabe Weaver

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COMMENT

Monitor
What is It? Who Needs It?

By Sue Searby

A "monitor" is not always just the kid in charge of checking the balls out and in for recess! In "computerese" the word "monitor" has taken several new meanings.

First, monitor can mean a video screen that hooks to a computer much like a TV on which the computer displays its information. This use of "monitor" could be replaced by the term, "CRT," or screen. The other use of "monitor" in computer jargon is less concrete and we will concentrate on it.

A monitor is a program, software, that communicates directly between you (the user) and the computer (CPU and memory). Like the elementary school's ball monitor, it has the responsibility of "go-between."

When the user types in one of the monitor's commands, the monitor will go to the computer's CPU or memory, fetch the information, and display it on the screen for the user to see. The monitor also has commands to tell the CPU to do something to change values in the memory.

In summary, the monitor is a "low level" communicator program between the user and the computer. Below are some example monitor commands and functions.

A - Examine and change A register
F - Find a byte string
G - Go to user's program
I - Initialize memory
J - Jump (subroutine) to address
K - Set breakpoint
M - Memory examine and change
L - Binary load from cassette
S - Binary save to cassette
T - Text input to memory
V - Set breakpoint and begin execution
W - Warm start into BASIC
Z - Display formatted memory dump

Who needs or uses a monitor program? A programmer who does machine language or assembly language programming uses the monitor to test his programs and learn about the internal operations of the CPU chip and the memory. Most users or even BASIC programmers do not have a need for a monitor program. Some companies who sell monitor programs use the rule, "If you don't know what a monitor is, you do not need one." Of course, even though you know what a monitor is, you need not assume you need one. And conversely, just because you don't need one does not imply you do not WANT one! A monitor is a very powerful and useful tool for those who are serious about learning the "nitty gritty" about computers and assembly language programming. And isn't this what it is all about— learning about this new technology? So do not be afraid to venture out, make mistakes, and learn new things either with a monitor program or with some other new concept you encounter.

(Ms. Searby is a principle in Computerware, which publishes a number of monitor programs for the Color Computer.)

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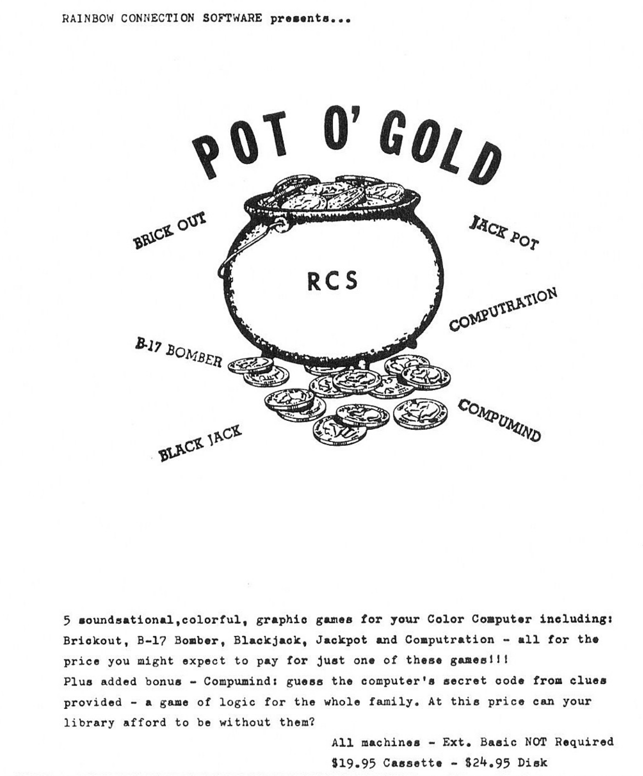

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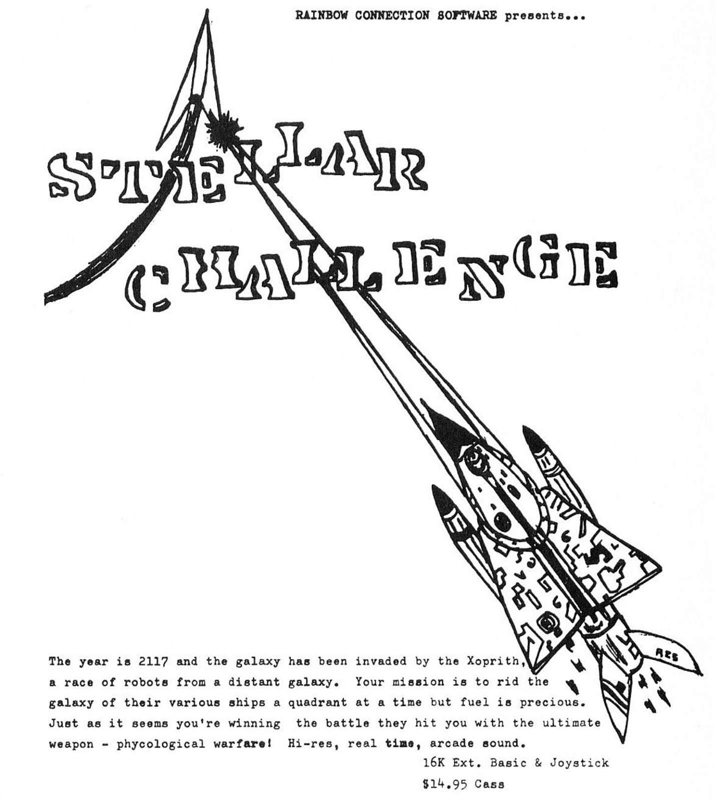

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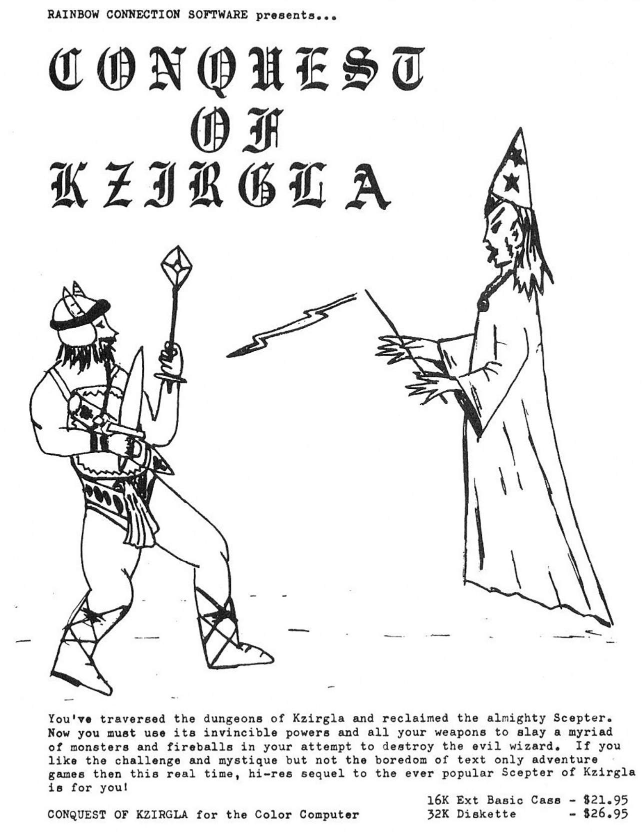

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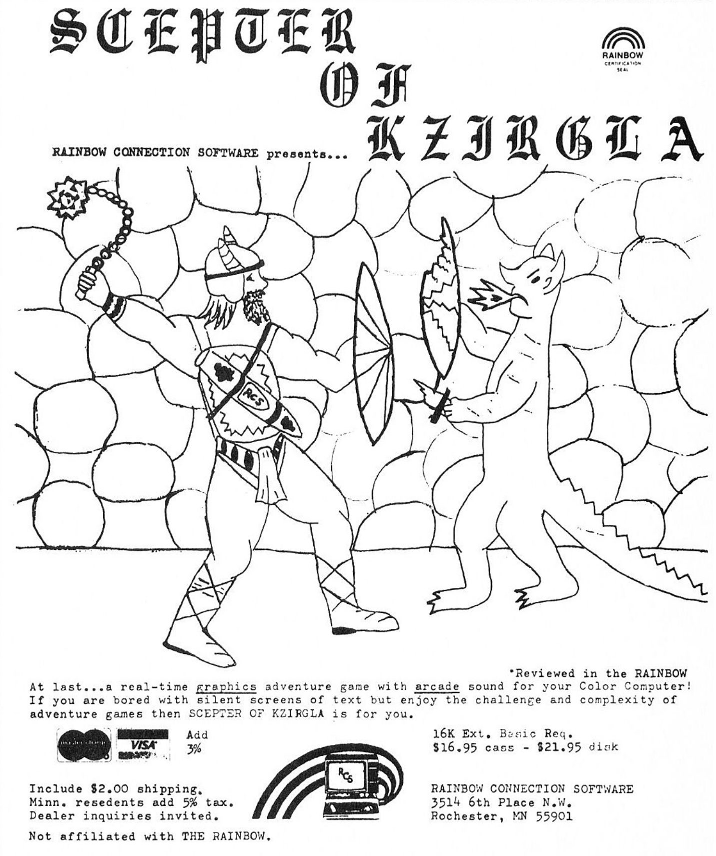

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TURN OF THE SCREW

Green On Black Video: 'Eye Friendly' Conversion

By Tony DiStefano

It's two o'clock in the morning and you are typing away on your TRS-80 Color Computer. Your eyes are burning because you've been staring at that bright green screen trying to create your "Do everything program" for hours. So you turn down the color, contrast and brightness of the display but that doesn't help too much. It's still a big square of light. Well...what can you do? Follow these simple instructions and when you are finished you will have a reversed screen like mine.

Though these instructions are simple, only those with soldering experience should attempt this project. You will need a Phillips screwdriver, a grounded soldering iron, solder, an IC extractor, two pieces of thin wire, flux cleaner, and a little patience. And, if you haven't received the warning before, opening your computer may void your warranty.

Before you start tearing into your computer, a bit of background on the VDG (Video Display Generator) is in order. The VDG is a large scale integrated circuit (LSI) chip that takes care of all the video you see on the screen, be it Alphanumeric or full graphic. The VDG continually scans memory (Via the SAM) and displays what it sees. In the Alphanumeric mode it converts the ASCII code of a byte of memory into a graphic block that looks like the letter it represents. Normally an upper case letter or number is black with a green background. Lower case letters are the opposite, green with a black background. What my circuit modification does is reverse the order so that upper case letters are green with black background and lower case letters are black with green background. This does not change anything in memory nor does it interfere with BASIC. It also does not change any graphic modes or color. Everything stays the same except the letters, numbers and symbols. The diagrams in this article pertain to most versions of the computer. Version 1.1, 1.0, 4K, 16K, 32K, 64K, BASIC, Extended BASIC, and even Disk BASIC are OK. The only version of which I cannot say "it works" is the newest version, the one with the power supply in the bottom left hand corner. It should be the version "F" but it is not written anywhere on the board.

Before you start into this, make sure that you have a large clean work space. Make sure the computer is not plugged in.

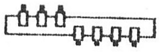

FIG-1

Put the computer upside down on a soft surface. Unscrew the seven screws that hold the cover on. If you haven't opened it before, the seventh screw is under the black sticker that warns you not to open this thing. Turn the unit over again (top side up) and pick up all the screws that fall out. Put them aside in a safe place. Remove the top cover and put that away, too. Lean forward slightly and gently pull up on the keyboard. Unplug the connector that ties the keyboard to the main board. Put the keyboard aside. Now cut the two tie wraps that hold the RF shield in place. That's the big square piece of metal with holes in it. Remove the RF shield and put it with the other parts. You are now ready for part two.

Before you start part two, let me tell you that the board is very sensitive to static electricity. Try to avoid dry areas and avoid touching the contacts on the board whenever possible. OK, let's get going. Locate and pull out the 74LS02 IC marked U29 on the PC board. Carefully bend pins 1, 2 and 3 so they stand straight up in the air upside down. The dot denotes pin #1. If you are facing the computer it is the top left hand corner. See Figure 1. Now solder one end of a four-inch piece of wire to pin #1 of the IC. The best wire to use is a #28 or #30 Wire Wrap wire. Solder another piece of six-inch wire to pins 2 and 3. Yes, both pins together. Now put the IC back in the socket. Make sure it is in the right orientation. The dot should be in the upper left hand corner. Also make sure that the wires and the pins do not touch the side of the RF shield. Now carefully remove the MC6847 IC marked U7 on the PC board. Bend pin #32 outwards just enough so that when you replace it, it does not go into the socket. Replace the MC6847. Again, make sure of the orientation. The dot should be in the upper right hand corner. Take the other end of wire that connects to pin 1 of the 74LS02 and solder it to pin 32 of the MC6847. Take the other end of wire that connects to pins 2 and 3 of the 74LS02 and solder that to

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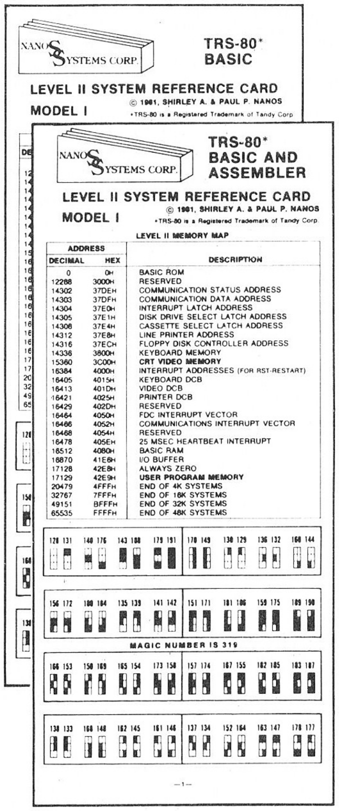

TRS-80* BASIC

LEVEL II SYSTEM REFERENCE CARD

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TRS-80* BASIC AND ASSEMBLER

LEVEL II SYSTEM REFERENCE CARD

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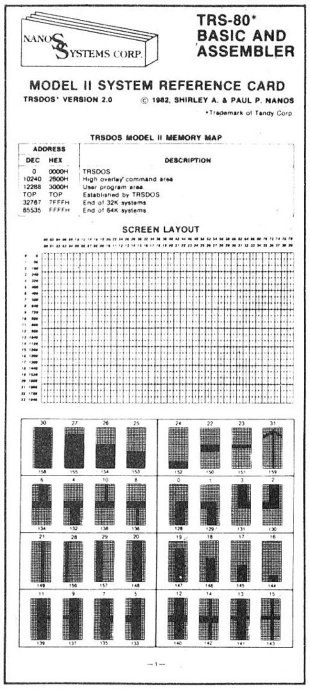
LEVEL II MEMORY MAP

ADDRESS		DESCRIPTION
DECIMAL	HEX	
0	0H	BASIC ROM
12288	3000H	RESERVED
14302	37DEH	COMMUNICATION STATUS ADDRESS
14303	37DFH	COMMUNICATION DATA ADDRESS
14304	37E0H	INTERRUPT LATCH ADDRESS
14305	37E1H	DISK DRIVE SELECT LATCH ADDRESS
14308	37E4H	CASSETTE SELECT LATCH ADDRESS
14312	37E8H	LINE PRINTER ADDRESS
14316	37ECH	FLOPPY DISK CONTROLLER ADDRESS
14336	3800H	KEYBOARD MEMORY
15360	3C00H	**CRT VIDEO MEMORY**
16384	4000H	INTERRUPT ADDRESSES (FOR RST-RESTART)
16405	4015H	KEYBOARD DCB
16413	401DH	VIDEO DCB
16421	4025H	PRINTER DCB
16429	402DH	RESERVED
16464	4050H	FDC INTERRUPT VECTOR
16466	4052H	COMMUNICATIONS INTERRUPT VECTOR
16468	4054H	RESERVED
16478	405EH	25 MSEC HEARTBEAT INTERRUPT
16512	4080H	BASIC RAM
16870	41E6H	I/O BUFFER
17128	42E8H	ALWAYS ZERO
17129	42E9H	**USER PROGRAM MEMORY**
20479	4FFFH	END OF 4K SYSTEMS
32767	7FFFH	END OF 16K SYSTEMS
49151	BFFFH	END OF 32K SYSTEMS
65535	FFFFH	END OF 48K SYSTEMS

MAGIC NUMBER IS 319

—1—

NEW!
QUICK REFERENCE



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MODEL II SYSTEM REFERENCE CARD

TRSDOS* VERSION 2.0 © 1982, SHIRLEY A. & PAUL P. NANOS

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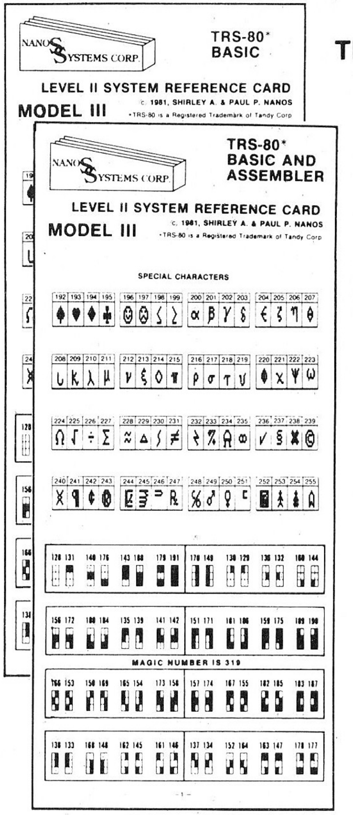
TRSDOS MODEL II MEMORY MAP

ADDRESS		DESCRIPTION
DEC	HEX	
0	0000H	TRSDOS
10240	2800H	High overlay command area
12288	3000H	User program area
TOP	TOP	Established by TRSDOS
32767	7FFFH	End of 32K systems
65535	FFFFH	End of 64K systems

SCREEN LAYOUT

—1—

SAVE TIME!



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SPECIAL CHARACTERS

MAGIC NUMBER IS 319

—1—

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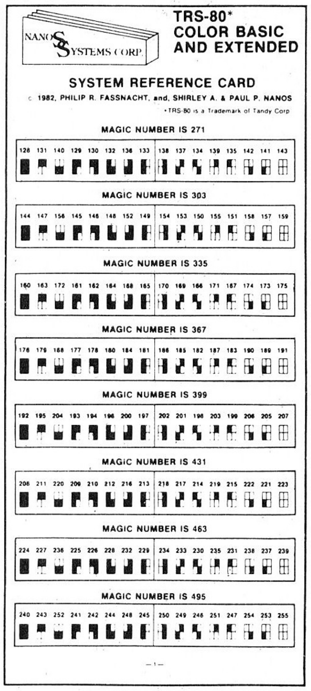

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MAGIC NUMBER IS 303

MAGIC NUMBER IS 335

MAGIC NUMBER IS 367

MAGIC NUMBER IS 399

MAGIC NUMBER IS 431

MAGIC NUMBER IS 463

MAGIC NUMBER IS 495

—1—

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Reserved Words.
Special Keys.
Ascii Character Chart,
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Control Codes.
Basic Internal Codes.
Hex/Dec Conversion Chart.
Screen Line Layout.
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Assembler Error Msgs.
Power-up Error Msgs.
Flags, Conditions, & Chart.
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SVC Procedure Panel.
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Basic Msgs & Codes.
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Basic Commands, Edit Subcommands, Special
Chars, Basic Statements, Facts, Functions,
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Basic Internal Codes.
Reserved Words.
Screen Line Layout.
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pin 2 on the MC6847. Be careful not to solder the pin to the socket. You won't be able to get the IC out if you do. Check the wiring and make sure that there are no shorts. Your wiring should look like the wiring in Figure 2. Now turn the power on. You should see the normal SIGN ON and copyright notice. Adjust the contrast, brightness and color on your TV so that you get crisp green letters with no background shading.

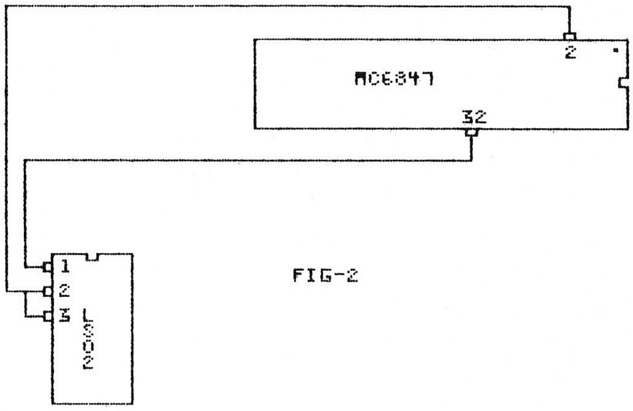

FIG-2

The closing up of the unit is the same as the opening, but in reverse. Turn the power off and replace the RF shield.

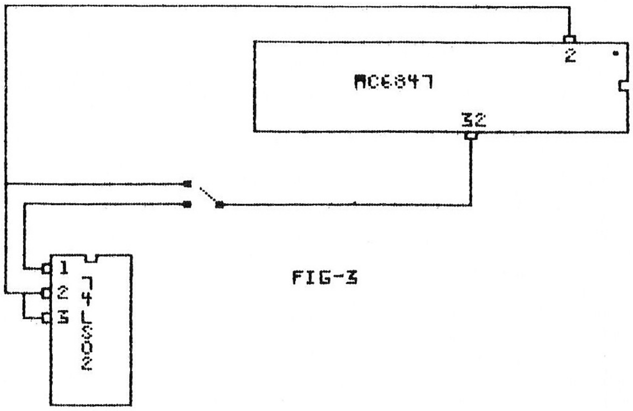

FIG-3

Again, make sure that there are no wires hanging out, and that there are no small pieces of wire or solder left in the closed area. Replace the keyboard and connector and put the lid back on. One thing to note when you are putting the bottom screws on is that there are two short screws. They go under the keyboard. If you put the long ones there you'll pierce a hole in the top cover. Do not overtighten them. After the computer is all back together again check all the functions just to make sure that all is running properly.

The whole operation should go off without a hitch, but if you do have problems retrace all of the above steps. The circuit does work, and if *yours* doesn't work you may have made a mistake somewhere. Some of you might want to add a switch to be able to change back and forth between normal and reversed screen. To do so, follow the wiring diagram in Figure 3. Make the wires long enough to be able to mount the switch on the outside cover or somewhere accessible when the cover is on. Warning! Wires that run outside of the RF shield can cause interference with your TV. Using a shielded wire will help. Ground the switch cover with a separate wire. This should take care of most of the RF problems.

Good luck.

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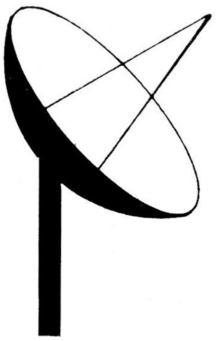
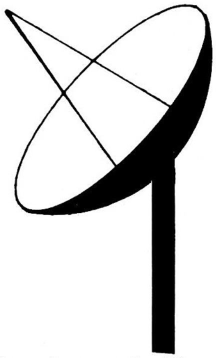


Rapid Logger Handles Contest 'Heat'



By B. B. Witham, Jr.

W4CNZ

The program listed here is sort of a natural follow up to my *Logsheet* (December '82 *Rainbow*) and *Duper* (January '83 *Rainbow*). It is the fourth in my series of *Hamplication* programs and contains many features of the previous programs, plus some new ones. There seemed to be a need for a specialized contest log that could go beyond a plain log and a separate *Duper* program in providing rapid logging input during the heat of a contest. Most contests have a set of rules that specify purpose, hours of operation, point scoring and the like. Getting all the various rules and scoring details into one program was my aim. The problem is that the differing requirements made it impossible to match all the contest rules. However, most of the factors can be included and the printout can be user modified, if needed. Even the scoring scheme can be changed to fit a particular contest. At least this program will provide a basis for ham operators to use their imagination in modifications.

Prior to running the program, I execute an M/L clock routine to use as a time input to the log. Any clock routine can be used as long as it places the current time in the upper right corner, where the screen addresses are *PEEKed* and relocated into the correct place of the log format. I did not include it as part of the program, because the ones I have are adequately available (*Chromasette* "CoCo-Coocoo", August '82) and (*CCNews* "Time Clock," December '82), and they are copyrighted. Choose your own. Anyway, the time of contact and then the outgoing contact number are automatically entered into the log format and memory.

After the timer is started, the parameters of the contest are entered into memory to use in scoring and printout. A "0" is entered for "not applicable" or "no score" items.

During entry of the scoring scheme, some contest rules specify only adding the total number of scoring points, while others multiply the number of contacts by the scoring points. For instance: *prefixes*—if the score is just 1 point for each prefix worked, then enter "prefix pts:"-1 and a '1' under (+) and 'enter' under (X). On the other hand, if the rules state to multiply the QSO's by two for each different prefic, then enter "prefix pts:"-2, under (+) 'enter' and under (X) -'1'. The scoring computations in lines 180-230 are adjusted accordingly.

The log format guides the operator through each QSO, keeping a record of those items needed for score and record. In the log form an "NA" is entered if the item is not a requirement of the particular contest. Upon entry of the call sign and frequency, the dupe routine checks to see if the station has been worked on that frequency before. If not, the program returns to the logging format for continued entry of data. If it is a dupe, this is reported and the program returns to input another call. On completion of each contact the record is dumped to disk. This is somewhat a waste of disk space, but it is quick, and avoids the problem of a full buffer and loss of data with variable length records. Since the program is written for two disk drives, I use drive #1 for my data storage. If a single drive is used, then change lines 80 and 98 by dropping the ':1' after the extension. If a cassette system is used, then make the following changes

Line 80 change #1 to #-1, delete /LOG:1
Lines 82, 84, and 86 change #1 to #-1
Line 98 change #1 to #-1, delete /LOG:1
Lines 98, 100, 102, 104, 106, and 108 change #1 to #-1

After the contest completion, the whole file can be reloaded and reviewed and/or printed out. The scoring factors and score are computed and are part of the print out. Of course, change the call sign in line 144. Also, if your computer will not take the speed-up *POKE*, delete these from lines 66, 70, 72, 174, and 214.

If any of you have lazy or tired fingers, these programs are available on tape cassettes. You may send a self-addressed, stamped envelope to B.B. Witham, Jr., 3501 Sea Gull Road, Virginia Beach, VA 23452. Also this, as well as most other programs published in *the Rainbow* are available on *Rainbow on Tape*.

Editor's Note: **The March issue of *A5 Amateur Television Magazine* is a special computer issue, with much emphasis on CoCo. For a free sample of *A5 ATV*, write Mike Stone, Editor, BDOQCD, P.O. Box H, Lowden, IA 52255-0408. See *A5 ATV's* ad for subscription information.**

24	0356
50	0890
78	0CB8
114	0F7F
150	1433
180	17DD
END	1B02

The listing:

```
1 REM******************************
2 REM UNIVERSAL CONTEST LOGGER
3 REM BY:BURT WITHAM JR. W4CNZ
4 REM    3501 SEA GULL ROAD
5 REM VIRGINIA BEACH, VA. 23452
6 REM      (804)-340-2628
7 REM   ALL RIGHTS RESERVED
8 REM  VERSION  1.0  1/26/83
9 REM******************************
10 CLEAR2000:GOTO234
12 Y=233:CLS2:FORX=1024 TO1055:P
OKEX,Y:POKEX+480,Y:NEXT:FORX=102
4 TO1535STEP32:POKEX,Y:POKEX-1,Y
:NEXT:PRINT@163," UNIVERSAL CONT
EST LOGGER ";:FORTM=1 TOTD:NEXT
14 DIMD$(3),EN$(12,200),ET$(5):J
```

```
=0:N=1:U=136:V=137:CT=0:SA=0:PF=
0:ZO=0:MB=0:TD=999:GOTO18
16 A$=INKEY$:IFA$="" THEN16 ELSE
RETURN
18 Q=484:Q$="PRESS ANY KEY TO CO
NTINUE":B=449:B$=" PRESS '#' TO
RETURN TO MENU"
20 REM MAIN MENU
22 CLS:PRINT@12,"M E N U ":PRINT
@65,"1) ENTER CONTEST DATA":PRIN
T" 2) LOG QSO DATA":PRINT" 3) LO
AD LOG":PRINT" 4) PRINT LOG":PRI
NT" 5) REVIEW LOG":PRINT" 6) EXI
T PROGRAM":PRINT:PRINT" SELECT (
1 - 6)":INPUTM
24 IFM<1 OR M>7 THENSOUND1,5:GOT
O22 ELSE ON M GOTO28,46,96,118,1
64,178
26 REM CONTEST DATA
28 CLS:PRINT@33,;:LINEINPUT"CONT
EST NAME AND OBJECT:";CN$
30 PRINT@193,"CATEGORIES: 1)  CW
   2)  PHONE":PRINT" 3)  SINGLE
OPER.":PRINT" 4)  MULTIPLE OPER.
":PRINT" 5)  EMERG. PWR.":PRINT"
 6)  LOW PWR.":PRINT" 7)  FIELD
DAY SITE"
32 PRINT@448,;:INPUT"IF ITEM NOT
 APPLICABLE ENTER '0'     OTHERW
ISE ENTER '1'.          ";CAT(1),C
AT(2),CAT(3),CAT(4),CAT(5),CAT(6
),CAT(7)
34 CLS:PRINT@33,"MULTIPLIER POIN
TS:":PRINT@97,"(ENTER 0 IF NOT U
SED- NR.OF PTS IF USED -ENTER 1
UNDER EITHER   ADD OR MULT.)":PR
INT@206,"(USED)  (+)  (X)":PRINT
@224,;:INPUT"QSO PTS:       ";QP:
PRINT@245,"----------"
36 INPUT"DX PTS:        ";DX:PRIN
T@277,;:INPUTDA:PRINT@282,;:INPU
TDM:INPUT"ZONE PTS:       ";ZP:PRI
NT@309,;:INPUTZA:PRINT@314,;:INP
UTZM:INPUT"MODE PTS:       ";MO:PR
INT@341,;:INPUTMA:PRINT@346,;:IN
PUTMM:INPUT"NR.OP. PTS:    ";OP:P
RINT@373,;:INPUTOA:PRINT@378
38 INPUT"PREFIX PTS:    ";CP:PRIN
T@405,;:INPUTCA:PRINT@410,;:INPU
TCM:INPUT"STATE PTS:      ";SP:PRI
NT@437,;:INPUTSA:PRINT@442,;:INP
UTSM:INPUT"MEMBER PTS:    ";MP:PR
INT@469,;:INPUTMA:PRINT@474,;:IN
PUTMM:CLS
40 PRINT@33,"FORMAT FOR CONTEST
NUMBERS:'XXXXXX'";:NN=NN+000001.
:FORTM=1 TOTD:NEXT
42 CLS:PRINT@129,;:LINEINPUT"ENT
ER CORRECT DATE TO START.    USE
 FORMAT: XX/XX/XX              ";D
```

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It should be noted that these speedup techniques do not work on all computers. The following program will let you know if the pokes work on your computer, and will give you an idea of the speed difference of each.

```
10POKE65494,0:CLS:?"THIS PROGRAM
SHOWS HOW LONG IT TAKES THE
COLOR COMPUTER TO COUNT TO 1000
IN THREE DIFFERENT SPEED MODES:"
20GOSUB100:T1=T
30POKE65495,0:GOSUB100:T2=T:POKE
65494,0
40POKE65497,0:GOSUB100:T3=T:POKE
65496,0:POKE65494,0
50?:?"NORMAL SPEED TOOK";T1;
"SECONDS":?"POKE 65495 TOOK";T2;
"SECONDS":?"POKE 65497 TOOK";T3;
"SECONDS":END
100TIMER=0:FORX=1TO1000:NEXTX:T=
TIMER/60:RETURN
```

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```
$:PRINT@Q,Q$;:GOSUB16:GOTO22
44 REM QSO DATA
46 CLS:PRINT@66,"HAVE YOU STARTE
D A M/L TIME   ROUTINE?":FORTM=1
 TOTD:NEXT:PRINT@129,"WHEN ENTER
ING LOG DATA, IF AN  ITEM DOES N
OT PERTAIN TO THIS   CONTEST ENT
ER 'NA'.":PRINT@B,B$:PRINT@Q,Q$;
:GOSUB16:IFA$="#" THEN22
48 FORI=1 TO300
50 CLS:PRINT@1,"LOG-":PRINT@8,"D
ATE:";D$:PRINT@64,"call:--------"
:PRINT@76,"FREQ:----":PRINT@85,"
TIME:-----"
52 POKEU,4:POKEV,69:LINEINPUTEN$
(1,I):IFEN$(1,I)="AA" THEN62 ELS
EPRINT@76,"freq:----":PRINT@85,"
TIME:-----":POKEV,81:LINEINPUTEN
$(2,I):GOSUB70:PRINT@85,"time:--
---"
54 FORR=1051 TO1055:SS=PEEK(R):P
RINT@90+J,CHR$(SS);:ET$(J)=CHR$(
SS):J=J+1:NEXTR:EN$(3,I)=ET$(0)+
ET$(1)+ET$(2)+ET$(3)+ET$(4):J=0
56 :PRINT@96,"nmbr (out):";:PRIN
TUSING"**####.";NN:PRINT@114,"(i
n):--------":POKEV,119:LINEINPUTE
N$(4,I):PRINT@128,"my rst:------
":PRINT@147,"RST:------":POKEV,1
35:LINEINPUTEN$(5,I):PRINT@147,"
rst:-------":POKEV,151
58 LINEINPUTEN$(6,I):PRINT@160,"
country:------------------------"
:POKEV,168:LINEINPUTEN$(7,I):PRI
NT@192,"state:------------------
--------":POKEV,198:LINEINPUTEN$(
8,I):PRINT@224,"prefix:-----":PR
INT@242,"ZONE:---":POKEU,4:POKEV
,231:LINEINPUTEN$(9,I)
60 PRINT@242,"zone:---":POKEU,4:
POKEV,247:LINEINPUTEN$(10,I):PRI
NT@256,"mbr nmbr:--------":PRINT@
273,"NOTES:->":PRINT@351,"<":POK
EU,5:POKEV,9:LINEINPUTEN$(11,I):
PRINT@273,"notes:->":PRINT@351,"
<":POKEV,23:LINEINPUTEN$(12,I)
62 PRINT@417,"CALL'AA' ENDS ENTR
Y MODE":GOSUB82:PRINT@B,B$:PRINT
@Q,Q$;:GOSUB16
64 IFA$="#" THEN22
66 NN=NN+1:N=N+1:NEXTI
68 REM DUPE CHECK
70 IFI>1 THEN72 ELSEIFI=1 THEN74
 ELSERETURN
72 POKE65495,0:FORDU=1 TOI-1
74 IFEN$(1,DU)=EN$(1,I) AND EN$(
2,DU)=EN$(2,I) THEN76 ELSEIFI=1
THENRETURN ELSENEXTDU
76 POKE65494,0:DU=0:RETURN
78 POKE65494,0:SOUND50,5:PRINT@6
```

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```
9,"dupe!!":FORTM=1 TO500:NEXT:DU
=0:GOTO46
80 REM SAVE LOG
82 VERIFY ON
84 FS$="L"+STR$(NN)
86 OPEN"O",#1,FS$+"/LOG:1"
88 IFI=1 THENWRITE#1,CN$:FORP=1
TO7:WRITE#1,CAT(P):NEXTP:WRITE#1
,QP,DX,ZP,MO,OP,PP,CP,SP,MP,D$
90 FORZ=1 TO3:WRITE#1,EN$(Z,I):I
FEN$(1,I)="AA" THENCLOSE#1:GOTO2
2 ELSENEXTZ:WRITE#1,NN:FORZ=4 TO
12:WRITE#1,EN$(Z,I):NEXTZ
92 CLOSE#1:RETURN
94 REM LOAD LOG
96 CLS:PRINT@103,"DISK DRIVE REA
DY?":PRINT@226,"PRESS <ENTER> TO
 LOAD LOGS":PRINT@B,B$;:GOSUB16
98 IFA$<>CHR$(13) THEN22
100 NR=1:I=1
102 FS$="L"+STR$(NR)
104 PRINT@356,"LOADING LOG:-";FS
$+"/LOG":OPEN"I",#1,FS$+"/LOG:1"
106 IFEOF(1)=-1 THEN114
108 IFI=1 THENINPUT#1,CN$:FORP=1
 TO7:INPUT#1,CAT(P):NEXTP:INPUT#
1,QP,DX,ZP,MO,OP,PP,CP,SP,MP,D$
110 FORZ=1 TO3:INPUT#1,EN$(Z,I):
IFEN$(1,I)="AA" THEN114 ELSENEXT
Z:INPUT#1,NN:FORZ=4 TO12:INPUT#1
,EN$(Z,I):NEXTZ
112 CLOSE#1:I=I+1:NR=NR+1:GOTO10
2
114 CLOSE#1::CLS:SOUND180,1:PRIN
T@230,"DISK LOAD COMPLETE.":FORT
M=1 TOTD:NEXTTM:GOTO22
116 REM PRINT LOG
118 CLS:PRINT@105,"PRINTER READY
?";:PRINT@B,B$:PRINT@Q,Q$;:GOSUB
16:IFA$="#" OR A$<>CHR$(13) THEN
22
120 CLS:LN=0:PRINT@171,"PRINTING
":PRINT#-2:PRINT#-2,CHR$(31)"CON
TEST:-";CHR$(30)
122 X=1:Y=LEN(CN$):LN=LN+2:PRINT
#-2,MID$(CN$,X,1);
124 PRINT#-2,MID$(CN$,X,1);
126 IF POS(-2)>70 THENIFMID$(CN$
,X,1)=CHR$(32) THENPRINT#-2,CHR$
(13):LN=LN+1
128 IFX=Y THEN130 ELSEX=X+1:GOTO
124
130 PRINT#-2,CHR$(13):LN=LN+1
132 PRINT#-2,"STATION INFO: 1) C
W-";:IF CAT(1)=0 THENPRINT#-2,"N
O"; ELSEPRINT#-2,"YES";
134 PRINT#-2,"    2) PHONE-";:IF
CAT(2)=0 THENPRINT#-2,"NO"; ELSE
PRINT#-2,"YES";
136 PRINT#-2,"     3) SINGLE OPE
RATOR-";:IFCAT(3)=0 THENPRINT#-2
,"NO"; ELSEPRINT#-2,"YES":PRINT#
-2,"  4) MULTIPLE OPERATOR-";:IF
CAT(4)=0 THENPRINT#-2,"NO"; ELSE
PRINT#-2,"YES";
138 PRINT#-2,TAB(15)"    5) EMER
GENCY POWER-";:IFCAT(5)=0 THENPR
INT#-2,"NO"; ELSEPRINT#-2,"YES";
140 PRINT#-2,"    6) LOW POWER (
QRP)-";:IFCAT(6)=0 THENPRINT#-2,
"NO" ELSEPRINT#-2,"YES"
142 PRINT#-2,"  7) FIELD DAY SIT
E-";:IFCAT(7)=0 THENPRINT#-2,"NO
" ELSEPRINT3-2,"YES"
144 PRINT#-2:PRINT#-2,"TOTAL CON
TACTS:";I-1:LN=LN+5:GOSUB182
146 PRINT#-2,"COUNTRIES WRKD:";C
T;TAB(21)"STATES WRKD:";ST-1;TAB
(37)"PREFIXES:";PF-1;TAB(49)"ZON
ES:";ZO-1;TAB(59)"MEMBERS WRKD:"
;MB-1:LN=LN+1
148 PRINT#-2:PRINT#-2,"TOTAL SCO
RE:";TP:LN=LN+2
150 PRINT#-2:PRINT#-2,;CHR$(31)"
LOG:-W4CNZ";CHR$(30);TAB(50)"DAT
E:-";D$:PRINT#-2:PRINT#-2,TAB(5)
"CALL";TAB(15)"FREQ";TAB(22)"TIM
E";TAB(30)"OUT NR.";TAB(40)"IN N
R.";TAB(51)"MY RST";TAB(59)"RST"
;TAB(66)"MEMBR NR.":LN=LN+4
152 FORG=1 TOI:IFG=I THEN158
154 PRINT#-2:PRINT#-2,TAB(4)EN$(
1,G);TAB(15)EN$(2,G);TAB(22)EN$(
3,G);TAB(30);:PRINT#-2,USING"**#
###.";G;:PRINT#-2,TAB(41)EN$(4,G
);TAB(52)EN$(5,G);TAB(59)EN$(6,G
);TAB(67)EN$(11,G):LN=LN+2:IF LN
=>60 THEN156 ELSENEXTG:GOTO158
156 FORSK=1 TO6:PRINT#-2:NEXTSK:
LN=0:NEXTG
158 PRINT#-2:PRINT#-2:PRINT#-2,T
AB(40)"OPERATOR(s):-------------
------------":LN=LN+3:SK=66-LN:FO
RLS=1 TOSK:PRINT#-2:NEXT
160 SOUND180,3:SOUND150,3:GOTO22
162 REM REVIEW LOG
164 CLS:NB=1:PRINT@1,"LOG-":PRIN
T@8,"DATE:"D$
166 FORK=1 TOI:PRINT@64,"CALL:";
EN$(1,K):IFEN$(1,K)="AA" THEN174
 ELSEPRINT@76,"FREQ:";EN$(2,K):P
RINT@85,"TIME:";EN$(3,K):PRINT@9
6,"NMBR (OUT):";:PRINTUSING"**##
##";NB:PRINT@114,"(IN):";EN$(4,K
)
168 PRINT@128,"MY RST:";EN$(5,K)
:PRINT@147,"RST:";EN$(6,K):PRINT
@160,"COUNTRY:";EN$(7,K):PRINT@1
92,"STATE:";EN$(8,K):PRINT@224,"
PREFIX:";EN$(9,K):PRINT@242,"ZON
```

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1

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```
E:";EN$(10,K)
170 PRINT@256,"MBR NMBR:";EN$(11
,K):PRINT@273,"NOTES:";EN$(12,K)
:PRINT@B,B$:PRINT@Q,Q$;:GOSUB16:
NB=NB+1:NEXTK
172 IFA$="#" OR A$<>CHR$(13) THE
N22
174 CLS:PRINT@170,"END OF FILE":
FORTM=1TO999:NEXT:GOTO22
176 REM EXIT ROUTINE
178 CLS:PRINT@174,"END":FORTM=1T
OTD:NEXT:CLS:END
180 REM COMPUTATION ROUTINES
182 POKE65495,0:FORCU=1 TOI
184 IFCU>1 THENFORCD=1 TOCU-1:IF
EN$(7,CD)=EN$(7,CU)THEN188 ELSEN
EXTCD
186 IFEN$(1,CU)="AA" OREN$(7,CU)
="NA" THEN190 ELSE CT=CT+1
188 NEXTCU
190 FORSU=1 TOI
192 IF SU>1 THENFORSD=1 TOSU-1:I
FEN$(8,SD)=EN$(8,SU) THEN196 ELS
ENEXTSD
194 IFEN$(8,SU)="NA" THEN196 ELS
EST=ST+1
196 NEXTSU
198 FORPU=1 TOI
200 IF PU>1 THENFORPD=1 TOPU-1:I
FEN$(9,PD)=EN$(9,PU) THEN204 ELS
ENEXTPD
202 IFEN$(9,PU)="NA" THEN204 ELS
EPF=PF+1
204 NEXTPU
206 FORZU=1 TOI
208 IF ZU>1 THENFORZD=1 TOZU-1:I
FEN$(10,ZD)=EN$(10,ZU) THEN212 E
LSENEXTZD
210 IFEN$(10,ZU)="NA" THEN214 EL
SEZO=ZO+1
212 NEXTZU
214 FORMU=1 TOI
216 IFEN$(11,MU)="NA" THEN218 EL
SEMB=MB+1
218 NEXTMU
220 IFDA=1 THENDX=(CT-1) ELSEIFD
M=1 THENDX=(DX*CT-1)
222 IFZA=1 THENZP=ZO-1 ELSEIF ZM
=1 THENZP=ZP*(ZO-1)
224 IFSA=1 THENSP=ST-1 ELSESP=SP
*(ST-1)
226 IFCA=1 THENCP=PF-1 ELSEIFSM=
1 THENCP=CP*(PF-1)
228 IFMA=1 THENMP=MB-1 ELSEIFMM=
1 THENMP=MP*(MB-1)
230 TP=QP+DX+SP+CP+ZP+MP+MO+OF+P
P:POKE65494,0:RETURN
232 REM PCLEARER
234 PCLEAR1:GOTO12
```

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of Spectrum Projects and taking issue with a letter we printed in which the writer expressed dissatisfaction with the Spectrum Stick joystick.

Mr. Cassidy's letter reads in part:

"Over the past twelve months I have had several dealings with Spectrum Projects and purchased many products, including the Spectrum Stick. I agree with your reviewer that it is an excellent joystick. Indeed, I have been satisfied with everything I have purchased from Spectrum Projects.

"However, the satisfaction with a specific product is not the point at hand. I was particularly concerned with the inference that 'Spectrum gets away with taking people.' In my many contacts with Spectrum Projects, I have always found Mr. (Bob) Rosen and his staff extremely friendly, courteous and, more importantly, fair and honest.

"It concerns me that (the writer of the original letter) gets away with a slur on a completely reputable company...I find it completely irresponsible on your part to publish such a potentially damaging letter without having fully researched the matter."

We are glad that this issue came up and that we have an opportunity to explain how we at *the Rainbow* deal with letters of complaint and, finally, how they find their way into our letters column. I want to explain it here, primarily because I think it will help everyone to know about the procedures we are supposed to follow.

But, let me emphasize, we are not a consumer watch-dog agency. In that regard, we certainly will try to help you solve any problem you may have—with an advertiser or, for that matter, with a non-advertiser. The *only* place we draw the line is with other publications. And there is a simple reason for that. To ultimately carry a letter about another publication failing to honor a subscription, being consistantly late or the like only sounds—at least to us—like *the Rainbow* trying to knock a competitor, no matter how "friendly" that competitor might be. So, generally speaking, you won't see much here about any other publication.

Aside from that, we have a procedure that we are supposed to follow in every case. Letters of complaint are forwarded to the firm in question, as a matter of information for the firm. We work on the assumption that you would like to have the problem resolved and, frankly, many times a letter to a third party is enough to resolve the issue. Firms are asked to let us know what has been done, or whether they would like to make a response if we print the letter in question.

I am beginning to get really excited about RAINBOWfest—which is, after all, "CoCo's Very First

Usually, most of the problems our readers experience are resolved in this way: Oftentimes it is only a lack of understanding on the part of one party or another, sometimes a problem with either the Postal Service or another carrier such as UPS.

We have two concerns in issues such as this. The first is for our readers, in terms of assisting them in any way possible. Since *the Rainbow* has been founded, I suspect several hundred disputes have been easily resolved when the two parties talked it out, either by mail or telephone.

The second concern is for the firm in question. We are fully aware of the "power of the press" and we intentionally set up procedures so that the firm has an opportunity to respond. To do otherwise would allow anyone with a "bone to pick" against someone else to simply fire off a letter and do considerable damage to someone's reputation.

In the case of the letter about which Mr. Cassidy wrote, this system did break down and the letter was printed before we offered Spectrum Projects an opportunity to respond. It was a serious error on our part and for that error, we wish to apologize to Mr. Bob Rosen and to Spectrum Projects. As a footnote, we understand the question has been fully resolved.

We do not wish to set ourselves up as an arbiter of disputes. That isn't our job. At the same time, we want to help settle any disputes which may arise in any way we can. And, we will publish "Brickbats" when the situation warrants—hopefully, at least, with a response from the other side. In short, we want to protect you, the reader's, right to complain. But, we also have the responsibility to protect firms from damaging comments which may not be their fault.

We feel, at least I do, that we have a responsibility to all concerned.

Finally, on a less weighty topic, I want to formally announce the beginning of *the Rainbow* Simulation Contest.

We expect the Simulation Contest, in terms of prizes, to be even bigger than the Adventure Contest for which the winners were announced in January. We are aiming for a special "Simulation Issue" this summer and we encourage your entries. To that end, we plan to publish a couple of Simulations to help you in the months ahead. But don't wait for them! Get going. We expect to set a May 30 deadline for entries. And, the sooner you get working the better.

—Lonnie Falk

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Software Review...

Stress Evaluator: Coping Techniques Called Helpful

Tension. Pain. Pound. Thump. Sounds like an old familiar commercial for a popular headache remedy. While an analgesic may indeed cover up pain, it does nothing to ameliorate the *cause* of the pain. Taking a pain medication is rather like cutting the wires to a fire alarm—it gets a lot quieter for a while, but watch out, the fire is still burning!

Today, the scientific community recognizes the powerful role that stress can play in bodily discomforts and illnesses. Headache, high blood pressure, lowered resistance to infections, nervous breakdowns, stroke and even cancer are some examples of conditions that may be caused or aggravated by excessive stress. Like any delicate piece of machinery, when the body is over stressed, bits and pieces begin to break down. Inevitably, there are innumerable prescription and non-prescription nostrums whose primary effect is to suppress the symptoms of an over stressed body and mind. It is all too easy to pop a pill or plop a couple of dissolving tablets into a glass of water; in fact, the drug industry heartily encourages you to do this with its high budget advertising. The message seems to be: It doesn't matter if you abuse your body, somewhere there is a pill, tablet or capsule that will take care of your symptoms.

If a philosophy of pill popping does not agree with you, there is an alternative: learn ways to evaluate your stress level and learn techniques for successfully coping with stress.

Petrocci Freelance Associates has recently released *Stress Evaluator*, a cassette based program for the Color Computer. The program incorporates questionnaires for evaluating your stress level, evaluating your ability to cope and assessing your comfort level. Also included are instructions for reducing stress through a meditative technique and a graphics screen to aid the process.

Stress can be physical or mental. Stress can be generated from unpleasant situations. But did you know that stress can also be produced by pleasant phenomena? The actual causative agent in the production of stress is simply a change from the status quo. Death of a spouse, divorce or getting fired from your job could all produce stress; so could marital reconciliation, retirement or an outstanding personal achievement.

Stress in and of itself is neither good nor bad. A moderate amount of stress is necessary for any achievement or increased productivity. Stress has a negative effect only when your ability to cope is exceeded. *Stress Evaluator* helps you determine your coping ability with a separate questionnaire. The program queries you on your virtues and your vices. Are you stubborn? Are you tolerant? Do you get upset easily? Your inmost secrets will be laid bare! Naturally, the CoCo will keep strict confidentiality.

After evaluating your ability to cope, *Stress Evaluator* will help determine your comfort or discomfort levels. You will be able to know whether to balance your level of comfort/discomfort for increased productivity or perhaps you need greater relaxation. For example, a boxer in the 15th round is likely to be experiencing great discomfort but high productivity in going the distance. If your coping ability is high, you, too, may wish to *increase* your discomfort level on the job thereby increasing your

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productivity. If your coping ability is low, it may be wise to decrease discomfort to avoid possible health problems.

Finally, the simple meditation technique (rhythmic breathing) provided with *Stress Evaluator* may be useful to those who wish to increase their coping ability. A sinusoidal wave form is presented on the graphics screen. You inhale on the rising portion of the curve and exhale on the falling portion of the curve. Very simple indeed! But relaxing.

I found the *Stress Evaluator* relatively easy to use. The colorful graphics output added much to the stress evaluation session. Another useful feature was the printer output of the various stress and coping factors. The software is self-documenting to the point that some users may find the extra written instructions superfluous. For the uninitiated, however, here is a hint: the software is loaded in three separate Extended BASIC programs. Each section must be started by typing the *RUN* command. The main program will tell you that another section is loading. When the load is complete, the Color Computer will print out its familiar OK. That is when you type *RUN* again.

Extended BASIC is required with at least 16K of memory.

(Petrocci Freelance Associates, 651 N. Houghton Road, Tucson, AZ 85748, $24.95 on cassette)

—Dr. Laurence D. Preble

Hackers Helper...

This Routine Draws Circles Around The Rest, Randomly

This month's Hackers Helper comes all the way from Humboldt, Saskatchewan, Canada—which, being north of Moose Jaw and east of Saskatoon, is farther from more places than most places.

Karl Germann, of Humboldt, writes,"This program is designed to shorten time and save memory by inputting all circle positions in a data statement...Use this method and I guarantee you that it will be worth the effort."

The secret to the beautiful patterns generated by the routine is the random coloring. The main purpose of the program is the *READ, DATA* statements. These are easy to execute and run at impressive speed.

Karl is 15 and reports he has just begun experimenting with CoCo. Keep on keeping on, Karl!

The listing:

END 0179

```
1 'BY:KARL GERMANN,BOX 2222,HUMB
OLDT,SASK.,S0K 2A0,CANADA
10 PMODE3,1:PCLS:SCREEN1,0
15 READ R,D:IF R=0 AND D=0 THEN
RESTORE:GOTO10
20 FOR PP=2 TO 16:FOR T=0 TO D S
TEP PP:C=RND(3)+1:CIRCLE(128,96)
,T,C,R:NEXTT,PP
25 FOR T=1 TO 500:NEXT:GOTO10
100 DATA.1,128,.2,128,.3,128,.4,
128,.5,128,.6,128,.7,.128,.8,128
,.9,128,1,96,1.1,90,1.2,84,1.3,8
0,1.4,74,1.5,68,1.6,64,1.7,60,1.
8,58,1.9,56,2,54,2.1,50,2.2,46,2
.3,40,2.4,36,2.5,32,0,0
```

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Let's Look At Keyboard Input

By Richard A. White

Virtually all but the simplest programs are going to have to get some information from the user. This information can come from the keyboard, the joystick, a tape file, a disk file, or some combination of these. First, let's look at input from the keyboard. It is the first input source the new programmer encounters. There are actually two consideratons, how to input data and how to test and use data immediately after it is input. Test? You've never hit the wrong key? Or, if you have and nothing happened, the program tested your response, didn't like it and gave you another chance. How data is input may be determined by how we are going to test and respond to the input.

Color Basic provides *INPUT* and *INKEY$* commands for keyboard input. Extended Basic adds *LINE INPUT*. Let's dissect them. Following are a number of *INPUT* examples:

```
INPUT I$
INPUT I
INPUT "A CHARACTER STRING";I$
INPUT "ENTER NAME, AGE, WEIGHT AND
TELEPHONE";NA$,A,W,TL$
```

INPUT will accept either a character string or a numeric variable. In accepting a string, it will take up to the number of characters the keyboard buffer will accept. Any number up to 1.70E38 may be entered. Numbers larger than this will cause an OV ERROR (overflow) message as the program crashes. A string can be used with *INPUT* to print a message, generally a description of the data to be entered. When the program encounters an *INPUT* statement, it prints whatever character string it is given and a "?". It then waits for a keyboard response. Note that a number of variables may be strung out after an *INPUT*. In the fourth example, the user could have responded;

```
?Jones,29,182,900-6782(ENTER).
```

Each time *INPUT* sees a comma or an *ENTER* it considers it the end of data for the variable it is working on. An alternate user response is to hit *ENTER* after each data item. In this case, *INPUT* prompts with a double question mark (??) for the next item it needs. Here is an example.

```
NAME, AGE, WEIGHT, TELEPHONE ? Jones
?? 26
?? 182
?? 900-6782
```

INPUT is not for all occasions because of a few characteristics that can be problems. It will not accept commas or colons in a string entry and is of mixed mind about dealing with quotation marks. It also forgets leading blanks. Finally, when the *ENTER* is pressed, the rest of the line is blanked and the cursor goes to the beginning of the next line. This can be a hair pulling event when you have spent time making an input menu super neat with color background and borders and the *INPUT* wipes part of it out. For the beginning programmer, pretty menus are off in the future. My advice is to learn, and use, *INPUT* though you will probably want to use *LINE INPUT* or *INKEY$* for most future keyboard entry. You will need it for tape and disk file handling.

We said that commas, quotes and colons give string input problems. Let's look at a few quirks when inputting numbers. One nice one is that *INPUT* overlooks spaces in numerical entry. You can answer the "?" with 100 247 89 and *INPUT* will make I = 100247892 as if you had typed that way. Entering a number with spaces can be easier an improve entry accuracy. However if your finger slips so th what you enter is 100 24U 892 *INPUT* will quit when comes to the "U" and return a stern ?REDO. Now this okay if you're entering screen format. But if you have two three variables after an INPUT and the error is in the th one, *INPUT* throws out all and starts over with?REDO. natural inclination would be to re-*ENTER* the offending entry, but *INPUT* wants all of them over again.

How does one find things like this out? With simple experimentation. You can learn most of what you need to know about how *INPUT* works by playing with the one line program below. It is listed along with a sample session of inputs and results. So, fire up CoCo and push keys with me.

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```
10 INPUT I$,J: PRINT I$,J: GOTO10
OK
RUN
? "TEST",9 <ENTER>
TEST            9   (INPUT stripped off the quotes)
? "TEST"-2,9 <ENTER>
? REDO              (INPUT must not like material in and out
                     of quotes mixed.)
? 3-"TEST",9 <ENTER>
3-"TEST"        9   (But, it took this and kept the quotes as
                     well.)
? 4-"TEST":9 <ENTER>
4-"TEST"        9   (Commas and colons act the same.)
? 5-"TEST:9:SOMETHING <ENTER>
? EXTRA IGNORED
5-"TEST"        9   (INPUT wanted data for two variables, and
                     that all it took.)
? 6-"TEST" <ENTER>
??                  (Data for only one variable was entered.)
?? 9 <ENTER>
6-"TEST"        9   (Now all is in.)
? 7-"TEST",10000E34 <ENTER>
7-"TEST"        1E38 (Basic has its own styles for numbers-)
? 8-"TEST",1E40
? OV ERROR IN 10    (as long as the numbers are not out of
                     limits.)
```

There is no way to keep the user from typing a number that is larger than 1.7E38 mentioned above and bombing the program. There are ways through character input and testing to avoid damage and we will get to these later.

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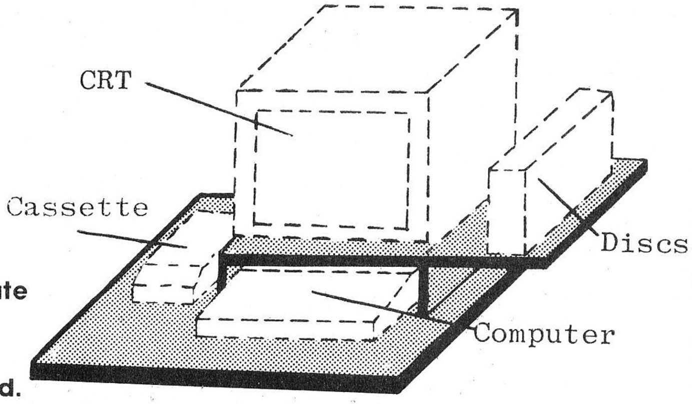

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LINE INPUT accepts only string inputs, one only at a time. Any keyboard character can be typed and *LINE INPUT* will take it. Since the characters are stored in the keyboard buffer before *ENTERing*, the back space acts to erase typed characters and will not be stored, nor will the erased characters. If you are writing a word processing or data mangagement program in BASIC, *LINE INPUT* is mandatory for keyboard input. Try writing English without commas. For these applications, you most likely would find a "?" printed before each entry a pain, so *LINE INPUT* omits printing the "?". If you want a question mark, you have to put it into your character string. Only the following two forms for *LINE INPUT* are allowed. Note that a space between *LINE* and *INPUT* is optional.

```
LINEINPUT I$
LINE INPUT "A CHARACTER STRING";I$
```

LINEINPUT I will cause a TM ERROR when data is entered and does not cause a SN ERROR. To see what LINEPUT can do experiment with the following program.

```
10 LINEINPUT"DATA";I$
20PRINT I$, :PRINT VAL(I$) :GOTO10
OK
RUN
DATA <ENTER>
                  0        (I$ contains only a carriage
                            return which VAL calls a 0)
DATA "TEST",,:"TEST" <ENTER>
"TEST",,:"TEST" 0          (Val calls any non-numeral a 0.
                            The text, commas, colons and all
                            was stored and printed as
                            entered.)
DATA 1123R456 <ENTER>
1123R456              1123 (VAL stops converting to a number
                            when it sees a non numeral.
                            We need error trapping.)
DATA 1123E22 <ENTER>
1123E22         1.123E25   (VAL treats an "E" as scientific
                            notation.)
DATA 1123E40 <ENTER>
OV ERROR IN LINE 20        (We need error trapping.)
```

Our experiments above have shown how we can enter nearly any keyboard character into a string using *LINE INPUT*. I leave it to the reader to experiment further and try to prove otherwise. We also built some conversion to numbers into the demonstration. We can do the same thing with converting an *INPUT* produced string to a number with identical results. The program bombs only when we try to convert a string to a number larger than 1.7E38. A keying error like "234U" will not be detected without added code. We would need to take a string apart and test it piece by piece for errors and ask for re-entry if all is not right. You need to make a decision on how important error trapping and user proofing of inputs are. There are two levels. One is catching data errors. The other is catching errors that will break the program and which are much more important to find.

Generally, input testing is best done on a character by character basis, though each need must be evaluated individually. Where user proofing or testing a short sequence of characters is the objective, *INKEY$* is a convenient tool. Its syntax is Z$=*INKEY$*. *INKEY$* checks to see what if any key has been pressed since the last *INKEY$* and program execution proceeds. If there has been a keystroke, Z$ will contain the character, otherwise Z$="". Since program execution proceeds, it is generally necessary to put *INKEY$* in a loop that is exited only when a key is pressed. In other cases, generally games, the loop will contain code causing continuing actions on the screen as well as the *INKEY* sampling so that the program does not wait for a player's response, but checks frequently to see if there is one. Below is a typical data input *INKEY* loop.

```
10 Z$=INKEY$ :IF Z$="" THEN 10 ELSE RETURN
```

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caterpillar

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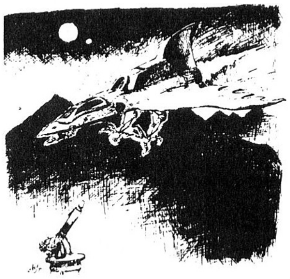

NEW

PLANET RAIDERS – Not just another defenders copy, this is an original program good in its own right. You pilot a one man ship across a planetary surface dogfighting with alien ships and blasting ground installations while you rescue stranded troopers. Rescue all the troopers and be transported to another harder, faster battle. Joysticks required. ALL MACHINE CODE! EDSONS BEST! 16K Tape TRS80COLOR $19.95 – 32K Disk $21.95.

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*INKEY$* may be used frequently in a program for a variety of purposes and is profitably placed in a low numbered subroutine for speed and memory saving. The code should also be kept to its simplest form with most data manipulations done by the calling routine. One exception is to convert Z$ to the number Z since numbers are frequently used as responses to menus and then decoded using *ON Z GOTO* frequently used as responses to menus and then decoded using *ON Z GOSUB* statements. The following modification fills the bill.

```
 10 Z$=INKEY$ :IF Z$="" THEN 10 ELSE Z=VAL(Z$)
:RETURN
```

Now that we have a single character input, how can we use it. The simplest application is to get and act on a single keystroke response to a menu.

```
MAIN MENU

1. INPUT
2. PRINT
3. LOAD
4. SAVE
5. QUIT
```

If line 1000 printed the menu, the next lines might be as follows.

```
1010 GOSUB10 :ON Z GOTO 100, 200, 300, 400, 500
1020 GOTO1010
```

If Z is greater than five, or Z equals zero, the program goes to 1020, which goes back to 1010 to get a new entry.

The use of a command line at the top or bottom of a working screen is a user-friendly device to remind the user what control options are available and the keystrokes required to invoke one. In an example from an information management program, the user has just finished entering a record, in either upper or lower case mode, and needs to tell the program what to do next. Options are to continue data entry, modify the record just entered or return to the main menu. This command line is presented:

```
cONTINUE mODIFY rETURN
```

The lower case (reverse video) signals the key to press for each function. Now we need to convert one of the letters "c, C, m, M, r, R" to an action. A neat way to do this that avoids a bunch of *IF THEN* statements is to use *INSTR* as follows:

```
250 GOSUB10 :Z = INSTR(1, "cCmMrR",Z$) :
 ON Z GOTO 200, 200, 500, 500, 1000, 1000
255 GOTO250
```

If Z$ is not one of the control letters, *INSTR* returns a 0 and the program tries again (Line 255). If a valid letter is returned, *INSTR* returns its count up the string and this number can be used directly in an ON Z *GOTO* or *GOSUB*. The Syntax of *INSTR* is fairly straightforward, the "1" tells *INSTR* to start at the first character of the string. Sorry Color BASIC people, *INSTR* is one of those Extended BASIC jewels, but you can write a short subroutine using MID$ to do the same thing. Our Apple friends have to do that all the time.

Another testing task might be to see that only numerals or a period are entered into an accounting routine and recognize the carriage return to end the input. Here is code to do this:

```
 250 GOSUB10 :Z = INSTR(1,"234567890.",Z$) :IF Z 0
THEN
   PRINT Z$; :A$=A$+Z$ :GOTO250 ELSE
   IF Z=0 AND Z$()CHR$(13) THEN 250
```

Here if Z$ is a number or a period, Z$ is added to A$ and Z$ is printed to the screen with a semicolon to hold the cursor. If Z$ is not anumber and it is not a carriage return, the program disregards the input and goes back for another character. The only other possible case is that Z$ is a carriage return and the program goes to the next step.

Routines like this which are continually getting a character and adding it to a string generate a lot of garbage in string space. The program must stop occasionally for the computer to clean things up and make room for new strings. This is a major reason not to use *INKEY$* for extensive string entry such as in a word processor or data file program.

Now for the homework assignment. Suppose you have written a Bulletin Board program and some jerk at the other end of the phone line has discovered he can crash your program by answering 1E40 when the program asks for the number of the message to be read. Write an input and error trapping routine to recognize and discard an out of limits number. Assume that your Bulletin Board is so good that you expect 10E30 messages over the next ten years. (If you believe that, I have a bridge for sale!) The best routine(s) sent to *the Rainbow* will be published in a later BITS AND BYTES OF BASIC.

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Frog Trek Hops Over High And Low Ground

Frog Trek is a program based on the arcade game *Frogger*. The object of *Frog Trek* is to guide your frog (using the keyboard) from the left side of the screen to the right side, without getting killed in the process. Sound easy? It really isn't, since you must shift your way through six lanes of rush hour traffic, dodge a threatening snake and hop from logs to turtles to the frog's home. Once four frogs reach their destinations, a new screen is drawn with faster traffic and a faster river current. After many hours of playing, I was only able to accomplish this screen once.

As is the case in most computer programs, *Frog Trek*, which requires 16K, has its good and bad qualities. Here are a few features and disappointments contained within this machine language program.

Graphics—The Graphics in *Frog Trek* are one of the program's attributes. The shapes are very clear and distinct; the frog looks like a frog, the turtles look like turtles, etc. Despite the many objects moving on the screen at once, there is no flicker. The program's author did a good job with the graphics in this game.

Sound—Sound is a vital part of any arcade program. Unfortunately, *Frog Trek* falls short in this area - nothing but short beeps and long beeps of different pitches. The documentations says that "if you succeed in bringing froggie home he will reward you with a friendly RIBB-IT." To me, this "RIBB-IT" seemed more like an alarm clock sounding off. I personally feel that the sounds should have been developed more thoroughly.

Documentation—The instructions included with this game are adequate. They tell how to play the game in an understandable manner. There were a couple of things I found missing from the documentation. There was no mention of scoring. I had to figure this out myself. Also, there wasn't any statement regarding the purpose of the timer. I believe the directions can be improved.

Bugs In The Program—To be honest, *Frog Trek* needs some major debugging. The bugs aren't that major in the game play, but at times are quite distracting. There are three problems worth noting. First, a few words of instructions are displayed before each game. This is fine, but the problem is the way it is written on the screen. It is shown like this:

```
USE ARROWKEYS TO CONTROL THE FRO
G HIT ANY KEY TO START GAME
```

I feel a quality computer program shouldn't have this program. A few more programming instructions would have cured this silly mistake. Second, once the timer runs down from sixty to zero, the computer thinks that the frog has reached its home. You are awarded 90 points, the frog goes back to the start, and best of all, your frog doesn't die. I don't mind this, but I would have found the game more challenging played against time. Finally, the problem I found most distracting was something that prohibits your frog from getting across sometimes. Once your frog reaches the middle island, it must jump from log to turtle. Well, sometimes the frog lands directly on top of the log or turtle and dies. Other times, the frog is not quite on the object and lives. This became more frustrating the more I played.

Despite these problems, I found *Frog Trek* to be enough of a challenge for the price. It seems to me that the author rushed his product out onto the market a little too quickly. If he were to work on his program a bit, and take some time debugging it, *Frog Trek* could be turned from a good program into a great one.

(Oelrich Publications, 4040 N. Nashville Ave., Chicago, IL 60634, $14.95)

—Ken Coleman

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EDUCATION

4K

4K, Non-Extended Tutor Spells 'Help'

By Ronald Pesha

Here is a program I developed to help my 10-year-old son practice his spelling. It is unusual, as I see it, in that the words are spoken to the child. It also scores the child and prints out the scoring at the end.

An important aspect of this program is that it requires only regular, not Extended, Color BASIC, and 4K is more than adequate. A cassette recorder is required, and two cassettes. Load the program on one cassette, using your own list of words. I have put a sample list of 20 spelling words in the program beginning with Line 100; just use *DATA* at Lines 100 to 119 at the rate of five words per line. If your list of spelling words has more or fewer words than 20, you will also need to change Line 130 and Line 220 as explained by the *REMARK* after each.

Now place a fresh cassette in the recorder and *ENTER* RUN 1000. Just follow the instructions. Speak the list of spelling words, in exactly the same order, into the microphone, following the instructions which will appear on the screen. You'll find that it is easy to change this cassette and the *DATA* lines in the program each week for the child to practice.

Type the program listing with spaces exactly as shown for the best appearance on the screen.

The listing:

```
 60   0192
210   03EE
END   0647
```

```
1 REM USE SEPARATE CASSETTES FOR
RECORDING PROGRAM AND AURAL WORD
LIST
2 CLS
3 Y=0:Z=0
4 AUDIO ON
5 PRINT @ 7, "SPELLING TEST": PR
INT
10 PRINT "BE SURE CASSETTE IS RE
WOUND AND TAPE MACHINE IS IN 'PL
AY' MODE.": PRINT
12 PRINT "BE SURE VOLUME CONTROL
 ON TV IS TURNED UP.": PRINT
15 INPUT "PRESS <ENTER> WHEN YOU
'RE READY,THEN WAIT TILL COMPUTE
R ASKS YOUFOR CORRECT SPELLING."
;E$
20 CLS
30 MOTOR ON
40 FOR X = 1 TO 1800
50 NEXT X
60 MOTOR OFF
70 INPUT "HOW DO YOU SPELL IT";A
$
90 REM TO CHANGE WORD LIST TYPE
NEW WORDS AFTER 'DATA' - 3 WORDS
PER LINE.
100 DATA TOBOGGAN, INDIAN, CABIN
, PELICAN, BUTTON
101 DATA CANNON, DRAGON, PARDON,
 RIBBON, WAGON
102 DATA EATEN, GIVEN, HIDDEN, R
IDDEN, OLDEN
103 DATA MITTEN, HEAVEN, OFTEN,
SALMON, MOCCASIN
120 READ F$
121 Y=Y+1
125 IF A$=F$ THEN GOTO 130 ELSE
GOTO 200
130 IF Y=20 GOTO 140
131 REM THE NUMBER IN "Y= " IN
LINE 130 SHOULD BE THE SAME AS
THE NUMBER OF WORDS IN THE LIST.
SAME IN LINE 220.
132 PRINT
133 INPUT "CORRECT. PRESS <ENTER
> FOR NEXT WORD.";E$
135 GOTO 20
140 PRINT "          CORRECT":GOT
O 300
200 PRINT "WRONG. IT IS SPELLED
"F$:PRINT
210 Z=Z+1
220 IF Y=20 GOTO 305
230 INPUT "PRESS <ENTER> FOR NEX
T WORD";E$
240 GOTO 20
300 PRINT
305 PRINT
310 PRINT "         END OF TEST":
PRINT
320 PRINT "HERE IS YOUR SCORE IN
"Y"WORDS.":PRINT
330 PRINT "         INCORRECT:"Z
340 PRINT "           CORRECT:"Y-
Z
350 END
990 REM 1000 BEGINS ROUTINE FOR
RECORDING WORD LIST
1000 PRINT "PUT RECORDER IS RECO
RD MODE BUT WITH 'AUX' PLUG OUT
OF ITS JACK SO MICROPHONE IS ON.
":PRINT
1005 PRINT "TAPE RUNS 4 SECS. FO
R EACH WORD.":PRINT
1010 PRINT "WHEN WORD LIST IS RE
CORDED ENTER'BREAK' AND REWIND T
APE.":PRINT
1020 INPUT "PUSH <ENTER> WHEN RE
ADY; WAIT 2 SECONDS AND SPEAK ON
E WORD.";E$
1025 CLS
1030 MOTOR ON
1040 FOR X = 1 TO 1840
1050 NEXT X
1060 MOTOR OFF
1070 GOTO 1010
```

Hardware Review...

Atari Joystick Adapters Endorsed

What is your high score at *Donkey King*? What? Well, there goes that theory. I was assured that after using an Atari joystick with the CoCo, my game scores would show a remarkable improvement. The only problem is that I no longer have the dexterity of a 10-year-old, semi-professional game player. At the same time, I am strong enough to tear the stick right out of its socket in frustration. I would recommend to anyone who enjoys games on his CoCo, that he invest in an adapter for converting the Atari joystick to the CoCo.

Many different manufacturers are now producing plug-compatible interface units for the true game addicts who spend hours trying to squeeze another 100 points out of their computers. As I happened to have more invested in Atari cartridges than in my computer—well, almost—I was very interested in the operation of these units. Two similar units were reviewed. The first was a single stick interface termed *Top Stix* by International Software. The second was the *Double Stick Interface* by Spectrum Projects, featuring two joystick ports. The *Double*, as I call it, comes with optional Atari joysticks. Both units performed as they are advertised.

The *Double* is housed as a 4"x2"x1" heavy plastic box that contains the Atari jacks. This unit is connected by two 36-inch cables to the joystick ports in the rear of the CoCo.

To say the least, this unit is "quality" contstructed. Unfortunately the *Top Stix* unit I reviewed is a demo, so I cannot comment on the final product.

Both units performed equally, but I picked up some extra noise on my TV screen with the *Double* in the line. After moving cables all over the place I gave up trying to completely eliminate the problem. I feel the extra lead length invites problems.

Now, for the problems. As you may have guessed, there are certain disadvantages to the use of an Atari joystick for certain games. The Atari units have switches instead of potentiometers inside the black box. What this means is that you don't have a linear or continuous output when you move the handle from right to left or top to bottom. Another way to look at it is to plug in your diagnostic program and look at the position of the joystick is either going to be in the middle of the screen or on one of the edges. There are no positions in between. What does this mean?

Well, for certain games, such as *Donkey King* or one of the Pac Man derivatives, where you just have to move to the right, left or up and down, it is insignificant, but what about *Polaris* or *Football*? These types of games require continuous (linear) motion.

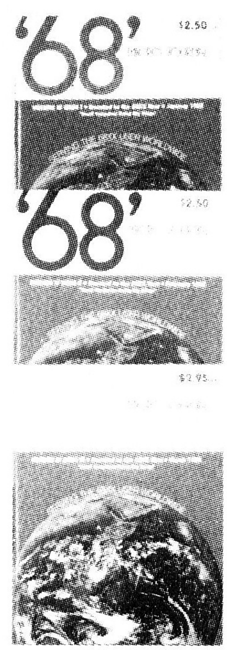
In summary, I say again that I recommend these units to anyone interested in action games. After reviewing my software library I found very few games that would not be compatible with the Atari joystick. Also, in my opinion, the ruggedness of these joysticks is a consideration when compared to some other products on the market.

Now if I could only get to the second screen!

(Double Stick Interface, Spectrum Projects, 93-15 86th Drive, Woodhaven, NY 11421, $19.95

Top Stix, International Software Inc., 771 Hockley Ave., Victoria, B.C., Canada V9B 2V5, $29.95)

—Dan Downard



™TRS80 color

From the January 1981 issue of the CSRA Computer Club newsletter:

> There was some amusement at the November meeting when the Radio Shack representatives stated that the software in the ROM cartridges could not be copied. This month's 68 Micro Journal reported they had disassembled the programs on ROM by covering some of the connector pins with tape. They promise details next month. Never tell a hobbyist something can't be done! This magazine seems to be the only source so far of technical informations on the TRS-80 color computer™. Devoted to SS-50 6800 and 6809 machines up to now. 68 Micro Journal plans to include the TRS-80 6809 unit in future issues.

NOTE. This and other interesting and needed articles for the Radio Shack TRS-80 color computer™ are being included monthly in 68 Micro Journal—The Largest specialty computer magazine in the world!

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DISCUSSIONS of the 6883 Synchronous Address Multiplexer, using the Color Computer™ with 64K and 96K memory (which it is ALREADY capable of handling), thoughts on Programming, etc.

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Bob Nay
Color Computer Editor

Bigfoot: More Board Game Than Adventure

"Deep in a dark and twisting maze, hiding in his lair, *Bigfoot* waits to ambush careless hunters who enter his domain."

So begins the documentation for the *Bigfoot* adventure. The object of this game is to find your way through a maze of rooms and passages to *Bigfoot's* hiding place and kill the monster. Along the way, you must avoid rooms filled with quicksand which immediately swallow you up into oblivion if you make the mistake of entering the room. Another potential hazard is a room with a giant bat. The bat may or may not be disturbed by your entering the room. If it is, it will pick you up and drop you randomly in another room. When you locate *Bigfoot* using the clues the game provides you get one shot to shoot into his lair and kill him. If you miss, the noise irritates him and he stomps on you—score one for the Sasquatch.

If you accidentally stumble into his lair, he stomps you before you can even think about shooting him. The game plays fairly quickly, usually taking less than five minutes to either kill or be killed. At the end of each round a three entry-score is displayed—"Hunter" (that's you), "Bigfoot," and "Quicksand."

Although the game is presented as a graphic adventure, it plays more like a video board game. The graphics do not display large rooms or dark passages. The rooms are small squares just large enough to hold the figure of the hunter. The entire maze, which could consist of up to 42 rooms, will fit on one screen. The "dark and twisting passages" are connectors between these rooms. There are three levels of difficulty for the mazes and four types of "mapping" for the hunter's movement through the maze. In normal mapping, when you begin a new maze you are randomly placed into one of the rooms and that room and its position are the only things displayed on an otherwise blank screen. As you move by use of the arrow keys to other rooms, each new room you enter is added to the display. In blind mapping, only the room you are in is displayed—all others are blanked as soon as you leave them. The blind mapping is certainly more challenging, trying to remember the relative locations of the rooms you have explored and their clues to Bigfoot's location.

Besides myself, our family has three expert game critics—16-, 14-, and 12-year-old sons. When I polled the boys for their opinions, the 16-year-old said, "It's OK." The 14- and 12-year-olds agreed that it was "pretty good."

They, of course, have many friends to assist them in their game playing. The greatest interest in *Bigfoot* came from the 12- to 14-year-old group. If you are a true adventurer along the lines of *Colossal Cave* or the Scott Adams adventures, *Bigfoot* is not what you are looking for. If you are a board game enthusiast and appreciate the extra dimension that a computer can offer through its graphics and ability to dynamically control the board, you may enjoy *Bigfoot*.

Bigfoot is written in Extended Basic and requires 32K.

(Genesis Software, P.O. Box 936, Manchester, MO 63011, $21.95 on tape)

—James G. Kriz

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UTILITY 16K ECB

Here's One For You, Roy

Here's a short, no nonsense program that we're quite sure Roy G. Biv, wherever under the sun he may be, will heartily endorse. Thus, the editors of *the Rainbow*, after due deliberation and reflection, have tapped out **David A. Cromley**, of Cheyenne, Wyoming, as the first recipient of the Roy G. Biv Award.

While David is the very first to be recognized with this special citation, the editorial staff of *the Rainbow* fully intends to confer this acknowledgement of meritorious service to others who make significant contributions to the Color Computer community (or who send in nice little programs that we like and think would be helpful to our readers). We believe it is a fitting tribute to Roy G. Biv, whose legendary and colorful name is known by heart, associated with happiness and recalled with fondness by friendly people in all walks of life, most anywhere the sun shines and the rain falls.

In offering to share his short listing with *Rainbow* readers, David A. Cromley writes, "Here is a little utility I frequently use to check the adjustment of the TV set. It also helps when I can't remember what magenta and cyan look like. Hitting the keys '0' through '8' changes the background color."

Here at *the Rainbow*, we enjoy "program quickies" such as David's *ColorCk*, and we hope to receive and print a lot more of them.

ColorCk! It's not the NBC peacock, but it is this month's winner of the Roy G. Biv Award.

END 019C

The listing:

```
110 '--COLORCK, D CROMLEY
120 CLS B: RESTORE
130 FOR X4=0 TO 48 STEP 16
140 FOR X2=0 TO 32 STEP 32: K=X2
+X4*4
150 PRINT@74+X2,STRING$(12,CHR$(
128));
160 PRINT @132+K,STRING$(10,CHR$
(143+X4));
170 PRINT @146+K,STRING$(10,CHR$
(207+X4));
180 NEXT X2: READ S1$,S2$
190 PRINT@103+K,S1$;: PRINT@117+
K,S2$;
200 NEXT X4: PRINT@78,"oblk";
210 PRINT @492,"BG COLOR?";
220 Q$=INKEY$: IF Q$="" THEN 220
230 IF Q$<"0" OR Q$>"8" THEN 220
240 B=ASC(Q$)-48: GOTO 120
250 DATA 1GRN,5BUF,2YEL,6CYN
260 DATA 3BLU,7MAG,4RED,8ORG
```

GET YOUR BUGS OFF YOUR HANDS.

Bugs in your programs can really get under your skin. Especially when they've been bugging you for longer than you'd like to think.

So get your bugs off your hands. And onto somebody else's.

Pack them off to DeBug. (On cassette, thank you.) With a description of where you were going. And where you got stuck. If it's an interesting enough program, we'll send it to people who like to stomp on other people's bugs.

If somebody can get all the bugs out of your 16K Extended Basic CoCo program, we'll try to sell it. And everyone shares the profits.

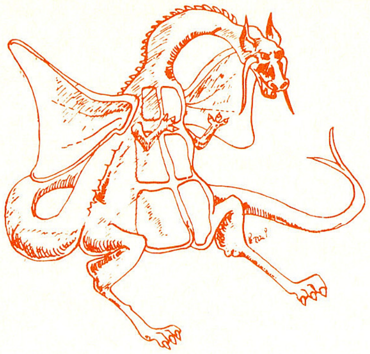
Send $5 per entry. Or $9 for a sample cassette of 20 or so very buggy programs. Or $12 for both.

DEBUG
114 West Central St., Natick, MA 01760

DEBUG
114 West Central St.
Natick, MA 01760

DRAGON'S BYTE

16K ECB



Create Character Files With This 'Finished' Program

By Bill Nolan
Rainbow Contributing Editor

Welcome to the March column. I wish I could say that I finally did this early, but the fact is that as I sit here at my computer, word-processing away in an effort to spruce up this final draft, the people at Federal Express are only two hours away. Yes, the editor of this most respected magazine said "it absolutely, positively had to be there overnight." That's what I get for waiting until the last minute.

As you know, we have been developing a plan for our major record keeping program over the last two months, and the "finished" program is below. I put finished in quotes because I know that no program is ever really finished. The programmer may think it is...

YOU'LL BE SORRY IF YOU DON'T READ THIS NEXT PART!

The program runs on a 16K Extended BASIC machine—barely! Before you type it in type *POKE 25,6:NEW* and *ENTER* to get the most memory, and then type this again every time before you load the program or you will get an OM ERROR. If you only have a 16K machine I recommend the following: Leave all REM lines out of the program (except line 11000—we jump to that one), and when it is all typed in and working, renumber it by typing RENUM 0,0,1 and pressing enter. This will make more memory available. Of course you saved it to tape first in case the computer crashed while renumbering. You can then change the *CLEAR* in line 5 to be *CLEAR 1200,16344:GOSUB.*

OH NOOooo....

Someone said as I demo'd C. C. Calc at the last meeting of the Northern Illinois Computer Club, "I just spent twice as much for half as much." He bought a copy anyway..... Save, Load, and Merge files - Yes! User specified Decimal Points? - Yes! Can you calculate 3% of $XX,XXX but not exceed $150? (Sound like the IRS?) - Yes! Stuck with Row and Column formulas? Not with C.C.Calc! Every cell on the spreadsheet can have its own formula.

C. C. Calc is the full featured, Electronic Spreadsheet that's designed for maximum, user controlled, flexibility on the Color Computer. The Command Summary fills three pages of the documentation but in short you have all the arithmetic operators, summation, replication, calculation order, selected column prints, screen prints and more.

Now the Color Computer has Smarts to match its muscle. C.C.Calc is available on cassette or disk for a ridiculously low $25.00. Requires 32K.

C.C.Calc $25

TransTek
194 Lockwood
Bloomingdale, IL 60108

If you have 32K, change line 5 to read *CLEAR 2000,32344:GOSUB...*Also change line 20 to read *FOR X*=32345 TO 32383:READ...and change the number 16345 in line 11032 to 32345. This will get you all kinds of memory for those changes you'll want to make.

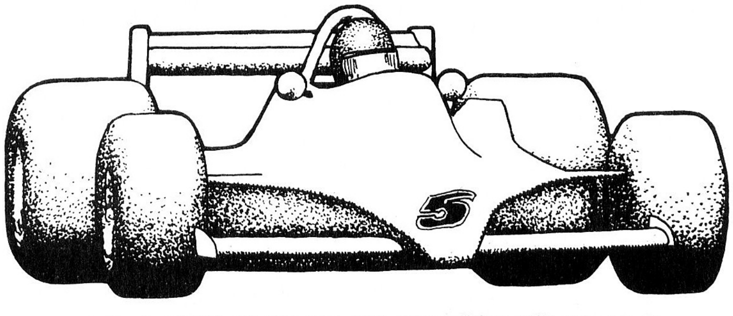
If you have disk, you will have to have 32K to use this program (unless you unplug your disk controller). Make the changes listed above for 32K machines, and in addition make the following changes in several lines between 1000 and 2000. Every time you find a CLOSE #-1, OPEN #-1, PRINT #-1, or INPUT #-1, delete the minus sign in front of the one. Also, you will want to change the PRINT in line 1030 to something more appropriate such as "MAKE SURE THE PROPER DISK IS IN DRIVE 1, AND THEN HIT ANY KEY TO GO ON."

Now, on to using the program. This program will create and update character records for fantasy games. The operation will be fairly obvious when you run it, but a couple of notes are in order. It allows you to enter up to 60 spells and non-magical possessions, and up to 20 magic items. It sorts the magic spells by level, and it allows you to make changes or deletions easily before saving a character record to tape or disk, or printing it on the screen or printer.

It does not store thieving ability scores since you don't enter them. It computes them when you select "8" on the main menu, so if you print out the information before selecting number 8, all thief scores will still be 0. Just make sure that you go to number 8 before printing out the character information.

This program *POKEs* a short machine language routine into memory. All of the *DATA* for this routine is in line 12050. This little routine puts a nice border around the screen whenever you call it, and it does it instantly! The border can be changed by poking a value other than 169 into memory location 346. The program does this *POKE* in line 20, so just edit that line to get a different border design. Values above 128 are best, but values about 255 will result in an error message. This routine is 37 bytes long and is in position independent code, so if you use it in another program you can put it wherever you want it.

YOUR COLOR COMPUTER JUST GOT WHEELS!



REVOLUTION!

You accelerate hard down a long straightaway, braking heavily at the end for a hard corner. You slice smoothly through the esses, and then boldly keep the power on for a fast sweeper. The Ferrari drifts dangerously near the edge, but you make a tiny correction in the steering, and you are through.

The finish line flashes by, and suddenly you are in the pits. The car falls silent. You see your lap times being held up. Your final lap was a new lap record! At last, you permit yourself a small smile.

You have mastered this powerful car on a difficult track, driving with the assurance and precision that comes only from long hours of practice.

You are driving an *authentic* race car. You are playing *Revolution!*

FANTASTIC ACTION

Revolution uses high resolution, machine language graphics for action that is smooth and fast. The emphasis is on authenticity in the control and motion of your car. As in driving a real race car, accuracy and precision in your driving are what counts. Frills and non-essentials have been left out.

PURE COMPETITION

Like a real race driver in practice and qualifying sessions, you compete against the clock and against the existing lap record for that track. *Revolution* records the lap records and the name of the person who set the record, so you always know who reigns supreme on your favorite track!

DESIGNED WITH YOU IN MIND

Revolution is menu-driven, and self explanatory. Information screens tell you what you need to know. When you're ready to play, a menu of the names of all your tracks is displayed, along with the lap record for each track and the name of the person who set that lap record. You select a track with a single keystroke, and *Revolution* takes you there.

A NEW CONCEPT

Revolution is a unique game, because it allows you to create the most important part of any race game: the track itself.

The first time you run *Revolution,* you will be able to choose from several tracks and cars which are included with the game.

But, with *Revolution,* this is only the beginning! You can create as many tracks as you like. You can make each new track as difficult or as easy as you wish. You can make easy ones to begin with, and tougher ones as you become more skilled. You may find creating tracks to be almost as much fun as driving on them!

You can save your favorite tracks to run on again whenever you wish. *Revolution* will automatically add these new tracks to the menu. And you can exchange your favorite tracks with other *Revolution* owners.

Be careful, though, about letting your friends play this game. They may not want to let you have your computer back!

THE EARLY *REVOLUTION*

A prototype version of *Revolution* was published in the September, 1982 issue of Rainbow magazine, under the name *The Track*. The response to *The Track* has been terrific.

Revolution has all the features that have made *The Track* a favorite, and *Revolution*'s fast, high-resolution machine language graphics are dramatically improved over the prototype's.

REVOLUTION NOW!

The original *Revolution* for the TRS-80™ Color Computer requires 32K and one disk drive. A new cassette version has action just like the disk version, and similar track-saving features excluding a menu of available tracks. The cassette version will run on a 16K Color Computer or TDP-100. You can upgrade to the disk version later, too, for a nominal fee.

REVOLUTION		
For 32K Disk	**$24.95**	*Requires Joysticks*
For 16K Cassette . . .	**$21.95**	*& Extended BASIC*

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Inter Action

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The print routine located at lines 2000 to 3000 takes advantage of a feature of the Color Computer which isn't mentioned anywhere I have seen. All of the accessories are addressed by the computer by referring to their device number. The disk drive is device number 1, the cassette is number-1, and the printer is number -2. Well, it happens that the television screen is device number 0, so you can print on the screen by doing a PRINT # 0, just as you would print on a printer by doing a PRINT # -2. You can also use a variable as the argument, as in PRINT # DV, and the output will go to the screen or printer depending on the value of the variable. By using this, the program will print on either the screen or printer and yet needs only one print routine. It just asks where you want it printed and sets the variable accordingly.

In the print routine I didn't use any control codes to make the print-out fancy. This was on purpose. (Really!) The control codes vary from machine to machine, and if your printer was a different brand from mine they wouldn't work, so if you want to get fancy on your own, have at it!

There is a two line section at 7300 and 7310 that sorts the magic spells by spell level. This routine is a very simple and short example of a bubble sort (a slow kind of sort, but easy to do) that would be practical for a list up to 100 or so entries long. The same general form could sort most anything.

I hope you will have as much fun using this program as I did writing it. It stores the files under the character name, so you should be able to put more than 50 files on a disk. If you have more than one on a tape, it will search the tape until it finds the correct one. I guess that wraps up this project, so we'll see what next month brings. If you have any suggestions write to me in care of Prickly-Pear Software, 9822 E. Stella Road, Tucson, AZ 85730.

master charge

VISA

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SALT LAKE CITY, UTAH 84110

RAINBOW CERTIFICATION SEAL

(Mr. Nolan, an experienced Dungeonmaster in a popular fantasy role playing game on a weekly basis, is the president of Prickly-Pear Software.)

1600	0691
2260	0D39
4050	1403
6450	1B68
8340	2441
END	2BD2

The Listing:

```
1 '***COPYRIGHT 1983***
2 '***PRICKLY-PEAR SOFTWARE***
3 '***ALL RIGHTS RESERVED***
5 CLEAR999,16344:GOSUB11030
20 FORX=16345TO16383:READXX:POKE
X,XX:NEXTX:POKE346,169
100 CLS:XJ=USR0(XJ):PRINT@46,"ME
NU";:PRINT@98,"1. LOAD OR SAVE I
NFORMATION";:PRINT@130,"2. PRINT
 OUT INFORMATION";:PRINT@162,"3.
 START A NEW CHARACTER";:PRINT@1
94,"4. UPDATE BASIC INFORMATION"
;:PRINT@226,"5. NON-MAGICAL POSS
ESSIONS";
110 PRINT@258,"6. MAGICAL POSSES
SIONS";:PRINT@290,"7. SPELL BOOK
";:PRINT@322,"8. THIEF ABILITIES
";:PRINT@354,"9. SAVING THROWS";
:PRINT@386,"0. COMBAT INFORMATIO
N";:PRINT@453,"KEY YOUR CHOICE (
1-0)";:K$=INKEY$
120 K$=INKEY$:IFK$<>"0"ANDVAL(K$
)<1THEN120ELSEK=VAL(K$):GOSUB110
20:IFK=0THENK=10
130 ONK GOTO1000,2000,3000,4000,
5000,6000,7000,8000,9000,10000
999 '***SAVE INFORMATION***
1000 CLS:PRINT" DO YOU WANT TO L
OAD OR SAVE A   CHARACTER (L/S)?
":K$=INKEY$
1010 K$=INKEY$:IFK$<>"L"ANDK$<>"
S"THEN1010ELSEGOSUB11020:IFK$="L
"THEN1500
1020 INPUT"CHARACTER NAME (8 OR
FEWER        LETTERS PLEASE)";CN$
1030 PRINT"PRESS PLAY AND RECORD
 ON THE      TAPE RECORDER, AND TH
EN HIT ANY KEY TO SAVE THE CHARA
CTER":K$=INKEY$:GOSUB11000
1040 OPEN"O",#-1,CN$
1050 FORX=0TO18:PRINT#-1,B$(X):N
EXTX
1060 FORX=0TO60:PRINT#-1,NP$(X):
NEXTX:PRINT#-1,NC
1070 FORX=0TO20:PRINT#-1,MP$(X,0
):PRINT#-1,MP$(X,1):NEXTX:PRINT#
-1,MC
```

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DEALER, AUTHOR INQUIRIES INVITED

```
1080 FORX=0TO60:PRINT#-1,SB$(X,0
):PRINT#-1,SB$(X,1):NEXTX:PRINT#
-1,SC
1090 FORX=1TO5:PRINT#-1,ST(X):NE
XTX
1100 FORX=0TO20:PRINT#-1,CI$(X):
NEXTX
1200 CLOSE#-1:GOTO100
1500 CLS:PRINT"LOADING A CHARACT
ER WILL ERASE  THE CURRENT MEMOR
Y.  ARE YOU    sure YOU WANT TO
DO THIS (Y/N)?":K$=INKEY$:GOSUB1
1060:IFK$="N"THEN100
1510 CLEAR:GOSUB11030:CLS:INPUT"
NAME OF THE CHARACTER YOU WANT
TO LOAD";CN$:GOSUB11020
1520 OPEN"I",#-1,CN$
1530 FORX=0TO18:INPUT#-1,B$(X):N
EXTX
1540 FORX=0TO60:INPUT#-1,NP$(X):
NEXTX:INPUT#-1,NC
1550 FORX=0TO20:INPUT#-1,MP$(X,0
):INPUT#-1,MP$(X,1):NEXTX:INPUT#
-1,MC
1560 FORX=0TO60:INPUT#-1,SB$(X,0
):INPUT#-1,SB$(X,1):NEXTX:INPUT#
-1,SC
1570 FORX=1TO5:INPUT#-1,ST(X):NE
XTX
1580 FORX=0TO20:INPUT#-1,CI$(X):
NEXTX
1600 CLOSE#-1:GOTO100
1999 '***PRINT INFORMATION***
2000 CLS:PRINT"DO YOU WANT THE I
NFORMATION      PRINTED ON THE SC
REEN OR ON THE PRINTER? (S/P)":K
$=INKEY$
2010 K$=INKEY$:IFK$<>"S"ANDK$<>"
P"THEN2010ELSEGOSUB11020:IFK$="S
"THENDV=0ELSEDV=-2
2020 CLS:IFDV=-2THENPRINT"MAKE S
URE THE PRINTER IS ON LINEAND TH
EN HIT ANY KEY TO START.":K$=INK
EY$:GOSUB11000
2030 PRINT#DV,C$(7);" = ";B$(7):
FORX=0TO6:PRINT#DV,C$(X);" = ";B
$(X):NEXTX:IFDV=0THENGOSUB11050
2040 FORX=8TO18:PRINT#DV,C$(X);"
 = ";B$(X):NEXTX:IFDV=0THENGOSUB
11050
2050 ZX=0:CLS:PRINT#DV,"NON-MAGI
CAL POSSESSIONS":FORX=0TO60:IFNP
$(X)=""THEN2070
2060 PRINT#DV,NP$(X):ZX=ZX+1:IFZ
X>13ANDDV=0THENGOSUB11050
2070 NEXTX:IFDV=0THENPRINT"HIT A
NY KEY":K$=INKEY$:GOSUB11000
2080 ZX=0:CLS:PRINT#DV,"MAGIC IT
EMS             CHARGES":FORX=0TO2
0:IFMP$(X,1)=""THEN2100
2090 PRINT#DV,MP$(X,0);TAB(27);M
P$(X,1):ZX=ZX+1:IFZX>13ANDDV=0TH
ENGOSUB11050
2100 NEXTX:IFDV=0THENPRINT"HIT A
NY KEY":K$=INKEY$:GOSUB11000
2110 ZX=0:CLS:PRINT#DV,"SPELL BO
OK":FORX=0TO60:IFSB$(X,1)=""THEN
2130
2120 PRINT#DV,SB$(X,0);TAB(4);SB
$(X,1):ZX=ZX+1:IFZX>13ANDDV=0THE
NGOSUB11050
2130 NEXTX:IFDV=0THENPRINT"HIT A
NY KEY":K$=INKEY$:GOSUB11000
2140 IFB$(17)="0"ORB$(17)=""THEN
2200
2150 CLS:PRINT#DV,"PICK POCKETS
---- ";PP:PRINT#DV,"OPEN LOCKS -
------ ";OL:PRINT#DV,"FIND TRAPS
------- ";FT
2160 PRINT#DV,"MOVE SILENTLY ---
 ";MS:PRINT#DV,"HIDE IN SHADOWS
- ";HS:PRINT#DV,"HEAR NOISE ----
-- ";HN:PRINT#DV,"CLIMB WALLS --
--- ";CW:PRINT#DV,"READ LANGUAGE
S -- ";RL
2170 IFDV=0THENPRINT"HIT ANY KEY
":K$=INKEY$:GOSUB11000
2200 CLS:PRINT#DV,"SAVING THROWS
":PRINT#DV,"DEATH, POISON, ETC.
=";ST(1):PRINT#DV,"PETRIFICATION
 OR POLY. =";ST(2):PRINT#DV,"ROD
S AND WANDS =";ST(3):PRINT#DV,"B
REATH WEAPONS =";ST(4):PRINT#DV,
"SPELLS =";ST(5)
2210 IFDV=0THENPRINT"HIT ANY KEY
":K$=INKEY$:GOSUB11000
2220 CLS:PRINT#DV,"ARMOR CLASS =
 ";CI$(0):PRINT#DV,"TO HIT ADJ.
= ";CI$(1):PRINT#DV,"DAMAGE ADJ.
 = ";CI$(2)
2230 IFDV=0THENPRINT"HIT ANY KEY
":K$=INKEY$:GOSUB11000
2240 CLS:PRINT#DV,"WEAPONS OF PR
OFICIENCY":ZX=0:FORX=3TO20:IFCI$
(X)=""THEN2260
2250 PRINT#DV,CI$(X):ZX=ZX+1:IFZ
X>13ANDDV=0THENGOSUB11050
2260 NEXTX:PRINT"HIT ANY KEY":K$
=INKEY$:GOSUB11000:GOTO100
2999 '***START CHARACTER***
3000 CLS4:PRINT@128,"STARTING A
NEW CHARACTER WILL  CLEAR INFOR
MATION CURRENTLY IN  MEMORY!!!
ARE YOU sure YOU WANTTO DO THIS
(Y/N)???";:K$=INKEY$
3010 K$=INKEY$:IFK$<>"Y"ANDK$<>"
N"THEN3010ELSEGOSUB11020:IFK$="N
"THEN100
3015 CLEAR:GOSUB11030
3020 CLS:INPUT" CHARACTER NAME";
```

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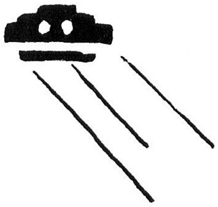

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```
B$(7):GOSUB11020:PRINT:INPUT" ST
RENGTH";B$(0):GOSUB11020:INPUT"
EX. STRENGTH %";B$(1):GOSUB11020
:INPUT" INTELLIGENCE";B$(2):GOSU
B11020:INPUT" WISDOM";B$(3):GOSU
B11020:INPUT" DEXTERITY";B$(4):G
OSUB11020
3030 INPUT" CONSTITUTION";B$(5):
GOSUB11020:INPUT" CHARISMA";B$(6
):GOSUB11020
3040 CLS:PRINT" ";B$(7):PRINT:PR
INT" CLASS OR CLASSES SEPARATED
BY   A SLASH (/)":INPUT" ";B$(8)
:GOSUB11020:INPUT" ALIGNMENT";B$
(9):GOSUB11020
3050 CLS:PRINT@68,"INDICATE RACE
";:PRINT@134,"1. DWARF";:PRINT@1
66,"2. ELF";:PRINT@198,"3. GNOME
";:PRINT@230,"4. HALF-ELF";
3060 PRINT@262,"5. HALFLING";:PR
INT@294,"6. HALF-ORC";:PRINT@326
,"7. HUMAN";:K$=INKEY$
3070 K$=INKEY$:K=VAL(K$):IFK<1OR
K>7THEN3070ELSEGOSUB11020:B$(18)
=K$
3080 ONK GOTO3090,3100,3110,3120
,3130,3140,3150
3090 B$(10)="DWARF":GOTO3160
3100 B$(10)="ELF":GOTO3160
```

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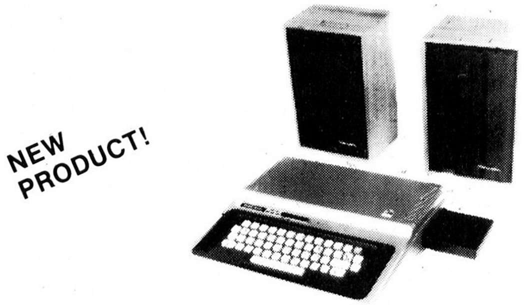
```
3110 B$(10)="GNOME":GOTO3160
3120 B$(10)="HALF-ELF":GOTO3160
3130 B$(10)="HALFLING":GOTO3160
3140 B$(10)="HALF-ORC":GOTO3160
3150 B$(10)="HUMAN"
3160 CLS:PRINT" ";B$(7):PRINT" "
;B$(8):PRINT:PRINT" LEVEL(S) (SE
PARATE WITH /)":INPUT" ";B$(16):
GOSUB11020:PRINT:PRINT" THIEVING
 SKILLS LEVEL":INPUT" ";B$(17):G
OSUB11020:IFVAL(B$(17))>17THENB$
(17)="17"
3170 CLS:PRINT" ";B$(7):PRINT:IN
PUT" AGE";B$(11):GOSUB11020:PRIN
T:INPUT" SEX";B$(14):GOSUB11020:
PRINT:INPUT" HEIGHT";B$(12):GOSU
B11020:PRINT:INPUT" WEIGHT";B$(1
3):GOSUB11020:PRINT:INPUT" HIT P
OINTS";B$(15):GOSUB11020:GOTO100
3999 '***UPDATE INFORMATION***
4000 CLS:XJ=USR0(XJ):FOR X=0 TO
18
4010 PRINT@34,"IS THIS CORRECT?
(Y/N)";
4020 PRINT@98,C$(X);" = ";B$(X);
:K$=INKEY$
4030 K$=INKEY$:IFK$<>"Y"ANDK$<>"
N"THEN4030ELSEGOSUB11020:IFK$="N
"THEN4045
4040 CLS:XJ=USR0(XJ):NEXT X:GOTO
 100
4045 IFX=18THENPRINT@353,"1=DWAR
F, 2=ELF, 3=GNOME,         4=HALF
-ELF, 5=HALFLING,          6=HALF
-ORC, 7=HUMAN"
4050 PRINT@162,"ENTER THE NEW ";
C$(X);:PRINT@194,"";:INPUTB$(X):
GOSUB11020:GOTO4040
4999 '***NON-MAGICAL ITEMS***
5000 CLS:XJ=USR0(XJ):PRINT@98,"1
. INVENTORY";:PRINT@162,"2. ADD
ITEMS";:PRINT@226,"3. DELETE ITE
MS";:PRINT@290,"4. RETURN";:PRIN
T@420,"KEY YOUR CHOICE";:K$=INKE
Y$
5010 K$=INKEY$:K=VAL(K$):IFK<1OR
K>4THEN5010ELSEGOSUB11020
5020 ONK GOTO5100,5200,5300,100
5100 ZX=0:CLS:PRINT@10,"INVENTOR
Y":FORX=0TO60
5110 IFNP$(X)=""THEN5150
5120 PRINTNP$(X):ZX=ZX+1:IFZX>13
THENGOSUB11050
5130 NEXTX
5150 PRINT"HIT ANY KEY":K$=INKEY
$:GOSUB11000:GOTO5000
5200 CLS:PRINT"ENTER AN ITEM (ZZ
 TO QUIT)":INPUT" ";K$:GOSUB1102
0:IFK$="ZZ"THEN5000
5205 IFNC>60THEN5230
```

THE STEREO COMPOSER



The **STEREO COMPOSER** music synthesizer was developed for the true music lover. All the features available for the **COMPOSER** described below are also available for the **STEREO COMPOSER**. However, instead of using the single 6 bit digital to analog converter built into the computer and the speaker built into your TV, the **STEREO COMPOSER** uses two 8 bit digital to analog converters which drive two audio power amplifiers. These amplifiers supply enough audio power to easily drive your own external speakers. If you like, the output may be connected to your home stereo system to further increase fidelity. Connection is provided by two phono connectors. If the music is too loud, two built-in volume controls are provided to allow you to control the volume of each of the channels separately. The advantage of being able to use external high quality speakers is obvious. The use of higher quality digital to analog converters serves to further increase music fidelity.

The **STEREO COMPOSER** produces music in stereo. Of the 4 voices produced, 2 are directed to each channel. This ability alone increases the realism of the music. You can even move the voices between speakers as the music plays.

The **STEREO COMPOSER** comes assembled, tested, burned in, with all the software and hardware to allow you to immediately start enjoying your music. A complete manual and examples are provided to give you everything you need to know.

The **STEREO COMPOSER** is completely memory decoded so it does not conflict with the Radio Shack disk controller. In this way, disk owners with an expansion interface such as the BT-1000 by Basic Technology can produce music from disk with the **STEREO COMPOSER** in one slot and the disk controller in another. In fact, you can even have **THE VOICE** in another slot without any fears that there will be memory conflicts.

Requires Extended BASIC and Minimum of 16K
Specify Cassette or Disk

STEREO COMPOSER (Hardware and Software)	$119.95

THE COMPOSER

The **COMPOSER** is a 4 voice music compiler which easily allows one to develop high quality music. Each voice is programmed separately. In addition, each voice uses its own waveshape table which means a unique sound for each of the 4 voices.

The **COMPOSER** features a 7 octave range. It supports dotted and double dotted notes as well as eighth, quarter, and standard triplet notes. Sixteenth and thirty second notes are also supported.

The **COMPOSER** allows the music to be played at any tempo and in any key. And believe it or not, the tempo and key can be modified as the music plays. This gives the user tremendous versatility in developing music. Key modification also allows the user to move the music up or down one or more octaves.

The **COMPOSER** displays a constantly changing random kaleidoscope pattern as the music plays. In addition, the number of the note being played is displayed which aids one in finding sour notes during music development. Both of these displays can be disabled to allow any screen to be displayed while the music is playing. In this way, one can show the words to a song or display a picture as the music plays.

The **COMPOSER** develops a machine language position independent subroutine that can be Saved, Loaded, and Executed independent of all other software. This means that you can share your music with friends. In fact, you can write your own BASIC programs that call and play the music. Software vendors may include the music in their own product.

The **COMPOSER** is menu driven making it extremely easy and friendly to use and operate. A thick operating manual is also provided. Many examples are given to aid the user in getting started. All you need is provided, no additional hardware is necessary. Don't let the price fool you, the **COMPOSER** has got to be heard to be appreciated.

Requires Extended BASIC and Minimum of 16K

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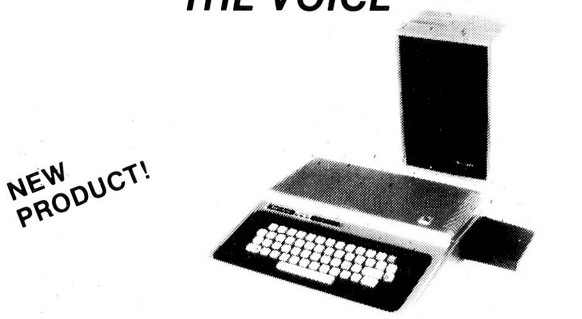
DISK VERSION (32K)	$29.95

THE VOICE



SPEECH SYSTEMS got its start providing high quality speech synthesizers for SS-50 bus computers. We are now proud to announce the same high quality product for the Color Computer and TDP-100.

THE VOICE should not be mistaken with software speech synthesizers which require the computer to do all the work in producing speech.

THE VOICE uses a special large scale integrated circuit, the SC-01 by VOTRAX, to reproduce any one of 64 phonemes at 4 inflections. Phonemes are basic units of speech which allow one to reproduce any word in English as well as many other languages.

THE VOICE has two outputs. Speech may be heard through the user's TV speaker, or the built-in audio power amplifier may be connected to your own external speaker. A phono connector is provided for this purpose and if the volume is too high, a built-in volume control may be used to adjust it to the proper level.

THE VOICE comes assembled, tested, burned in, with all the necessary hardware and software. A complete manual with many examples are provided to get you started in developing your own BASIC or machine language programs to use speech.

THE VOICE is completely memory decoded so it does not conflict with the Radio Shack disk controller. In this way, disk owners with an expansion interface such as the BT-1000 by Basic Technology can produce speech from disk with **THE VOICE** in one slot and the disk controller in another. In fact, you can even have the **STEREO COMPOSER** in another slot without any fears that there will be memory conflicts.

We are trying to develop a library of software for **THE VOICE**. Toward this end, we will be offering substantial royalties to software authors for their work.

Requires Extended BASIC and Minimum of 16K
Specify Cassette or Disk

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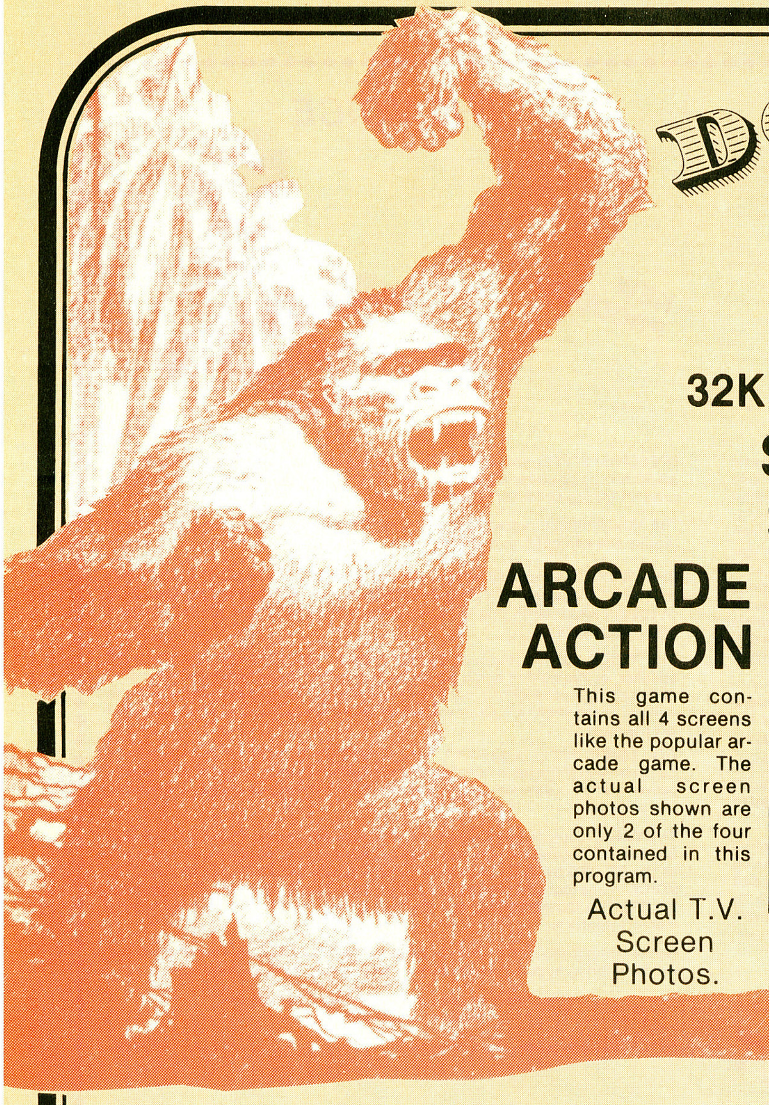


DONKEY KING

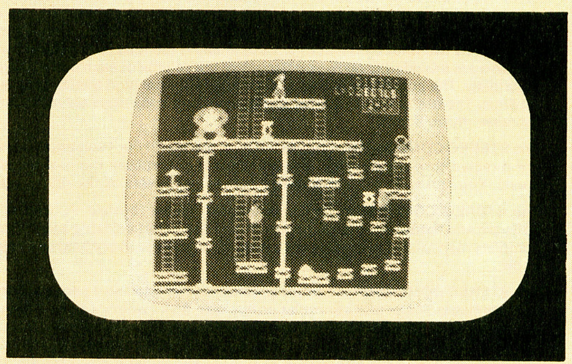
(C) 1982

32K Machine Language

$26.95 TAPE
$29.95 DISK

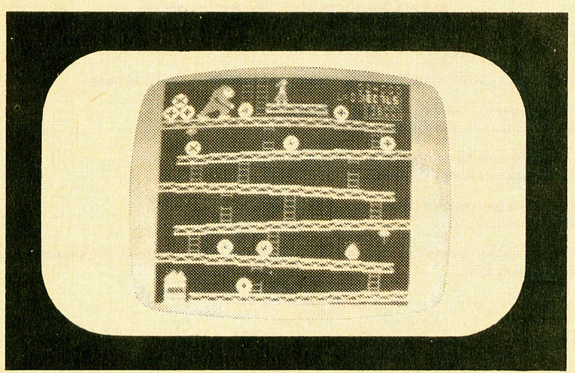
ARCADE ACTION

This game contains all 4 screens like the popular arcade game. The actual screen photos shown are only 2 of the four contained in this program.



Actual T.V. Screen Photos.

How high can you climb? Plays like the popular arcade game!



Four full graphic screens. Exciting sound and realistic graphics. Never before has the color computer seen a game like this. Early reviews say simply outstanding.

RAINBOW: Donkey King is the king of the donkey games and a fantastic rendition of a popular arcade offering.

COLOR COMPUTER: Consider the excellence of Donkey King as an example of what the Color Computer is capable of.

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```
5210 NP$(NC)=K$:NC=NC+1:IFNC>60T
HEN5230
5220 GOTO5200
5230 PRINT"FILE FULL":FORX=1TO20
00:NEXTX:GOTO5000
5300 CLS:PRINT"WHAT DO YOU WANT
TO DELETE?":INPUTK$:GOSUB11020
5310 FORX=0TONC:IFK$=NP$(X)THEN5
330
5320 NEXTX:PRINT"FILE NOT FOUND"
:FORX=1TO2000:NEXTX:GOTO5000
5330 NP$(X)=""
5340 FORY=X TONC:NP$(Y)=NP$(Y+1)
:NEXTY
5350 FORX=0TO61:IFNP$(X)=""THENN
C=X:GOTO5000
5360 NEXTX
5999 '***MAGICAL POSSESSIONS***
6000 CLS:XJ=USR0(XJ):PRINT@98,"1
. INVENTORY";:PRINT@162,"2. ADD
ITEMS";:PRINT@226,"3. DELETE ITE
MS";:PRINT@290,"4. CHANGE CHARGE
S";:PRINT@354,"5. RETURN";:PRINT
@420,"KEY YOUR CHOICE";:K$=INKEY
$
6010 K$=INKEY$:K=VAL(K$):IFK<1OR
K>5THEN6010ELSEGOSUB11020
6020 ONK GOTO6100,6200,6300,6400
,100
6100 ZX=0:CLS:PRINT@10,"INVENTOR
Y":FORX=0TO20
6110 IFMP$(X,0)=""THEN6150
6120 PRINTMP$(X,0);TAB(27);MP$(X
,1):ZX=ZX+1:IFZX>13THENGOSUB1105
0
6130 NEXTX
6150 PRINT"HIT ANY KEY":K$=INKEY
$:GOSUB11000:GOTO6000
6200 CLS:PRINT"ENTER AN ITEM (ZZ
 TO QUIT)":INPUT" ";K$:GOSUB1102
0:IFK$="ZZ"THEN6000
6205 IFMC>20THEN6230
6207 INPUT"ENTER THE CHARGES";MP
$(MC,1):GOSUB11020
6210 MP$(MC,0)=K$:MC=MC+1:IFMC>2
0THEN6230
6220 GOTO6200
6230 PRINT"FILE FULL":FORX=1TO20
00:NEXTX:GOTO6000
6300 CLS:PRINT"WHAT DO YOU WANT
TO DELETE?":INPUTK$:GOSUB11020
6310 FORX=0TOMC:IFK$=MP$(X,0)THE
N6330
6320 NEXTX:PRINT"FILE NOT FOUND"
:FORX=1TO2000:NEXTX:GOTO6000
6330 MP$(X,0)="":MP$(X,1)=""
6340 FORY=X TOMC:MP$(Y,1)=MP$(Y+
1,1):MP$(Y,0)=MP$(Y+1,0):NEXTY
6350 FORX=0TO21:IFMP$(X,0)=""THE
NMC=X:GOTO6000
6360 NEXTX
6400 CLS:PRINT" ON WHICH ITEM DO
 YOU WANT TO    CHANGE THE CHARG
ES?":INPUT" ";K$
6410 FORX=0TO21:IFMP$(X,0)=K$THE
N6450
6420 NEXTX
6430 PRINT" ITEM NOT FOUND":FORX
=1TO2000:NEXTX:GOTO6000
6450 PRINT:PRINT" THE ITEM HAS "
;MP$(X,1);" CHARGES":PRINT" NOW.
  INPUT THE CORRECT.":INPUT" NUM
BER";MP$(X,1):GOSUB11020:GOTO600
0
6999 '***MAGIC SPELLS***
7000 CLS:XJ=USR0(XJ):PRINT@98,"1
. ADD A SPELL";:PRINT@162,"2. DE
LETE A SPELL";:PRINT@226,"3. SOR
T THE SPELLS";:PRINT@290,"4. SPE
LL BOOK";:PRINT@354,"5. RETURN";
:PRINT@450,"KEY YOUR CHOICE";:K$
=INKEY$
7010 K$=INKEY$:K=VAL(K$):IFK<1OR
K>5THEN7010ELSEGOSUB11020
7020 ONK GOTO7100,7200,7300,7400
,100
7100 CLS:IFSC>60THEN7190
7105 PRINT" ENTER THE SPELL NAME
 (ZZ TO      QUIT)":INPUT" ";SB$(
SC,1):GOSUB11020:IFSB$(SC,1)="ZZ
"THENSB$(SC,1)="":GOTO7000
7110 PRINT:INPUT" WHAT LEVEL";SB
$(SC,0):GOSUB11020:SC=SC+1:IFSC>
60THEN7190
7120 GOTO7100
7190 PRINT"FILE FULL":FORX=1TO20
00:NEXTX:GOTO7000
7200 CLS:PRINT" SPELL TO DELETE"
:INPUT" ";K$:GOSUB11020
7210 FORX=0TOSC:IFK$=SB$(X,1)THE
N7240
7220 NEXTX:PRINT" FILE NOT FOUND
":FORX=1TO2000:NEXTX:GOTO7000
7240 SB$(X,0)="":SB$(X,1)="":FOR
XX=X TO60:SB$(XX,0)=SB$(XX+1,0):
SB$(XX,1)=SB$(XX+1,1):NEXTXX
7250 FORX=0TO60:IFSB$(X,1)=""THE
NSC=X:GOTO7000
7260 NEXTX
7300 CLS:PRINT" SORTING":FORX=0T
OSC-2:IFSB$(X,0)>SB$(X+1,0)THENK
$=SB$(X,0):SB$(X,0)=SB$(X+1,0):S
B$(X+1,0)=K$:K$=SB$(X,1):SB$(X,1
)=SB$(X+1,1):SB$(X+1,1)=K$:GOTO7
300
7310 NEXTX:GOTO7000
7400 ZX=0:CLS:PRINT@10,"SPELLBOO
K":FORX=0TO60
7410 IFSB$(X,1)=""THEN7450
7420 PRINTSB$(X,0);TAB(4);SB$(X,
1):ZX=ZX+1:IFZX>13THENGOSUB11050
7430 NEXTX
7450 PRINT"HIT ANY KEY":K$=INKEY
$:GOSUB11000:GOTO7000
7999 '***THIEVING SKILLS***
8000 CLS
8020 L=VAL(B$(17)):IFL=0THEN100
8030 PP=DA(L,0):OL=DA(L,1):FT=DA
(L,2):MS=DA(L,3):HS=DA(L,4):HN=D
A(L,5):CW=DA(L,6):RL=DA(L,7)
8040 D=VAL(B$(4)):IFD>18THEND=18
8050 D=D-8:OND GOSUB8180,8190,82
00,8210,8220,8220,8220,8230,8240
,8250
8090 K=VAL(B$(18))
8100 ONK GOSUB8110,8120,8130,814
0,8150,8160,8170:GOTO8260
8110 OL=OL+10:FT=FT+15:CW=CW-10:
RL=RL-5:RETURN
8120 PP=PP+5:OL=OL-5:MS=MS+5:HS=
HS+10:HN=HN+5:RETURN
8130 OL=OL+5:FT=FT+10:MS=MS+5:HS
=HS+5:HN=HN+10:CW=CW-15:RETURN
8140 PP=PP+10:HS=HS+5:RETURN
8150 PP=PP+5:OL=OL+5:FT=FT+5:MS=
MS+10:HS=HS+15:HN=HN+5:CW=CW-15:
RL=RL-5:RETURN
8160 PP=PP-5:OL=OL+5:FT=FT+5:HN=
HN+5:CW=CW+5:RL=RL-10:RETURN
8170 RETURN
8180 PP=PP-15:OL=OL-10:FT=FT-10:
MS=MS-20:HS=HS-10:RETURN
8190 PP=PP-10:OL=OL-5:FT=FT-10:M
S=MS-15:HS=HS-5:RETURN
8200 PP=PP-5:FT=FT-5:MS=MS-10:RE
TURN
8210 MS=MS-5:RETURN
8220 RETURN
8230 OL=OL+5:RETURN
8240 PP=PP+5:OL=OL+10:MS=MS+5:HS
=HS+5:RETURN
8250 PP=PP+10:OL=OL+15:FT=FT+5:M
S=MS+10:HS=HS+10:RETURN
8260 PRINT@67,"PICK POCKETS ----
  ";PP
8270 PRINT@99,"OPEN LOCKS ------
  ";OL
8280 PRINT@131,"FIND TRAPS -----
-  ";FT
8290 PRINT@163,"MOVE SILENTLY --
-  ";MS
8300 PRINT@195,"HIDE IN SHADOWS
-  ";HS
8310 PRINT@227,"HEAR NOISE -----
-  ";HN
8320 PRINT@259,"CLIMB WALLS ----
-  ";CW
8330 PRINT@291,"READ LANGUAGES -
-  ";RL
8340 PRINT@355,"PRESS ANY KEY TO
 GO ON";:K$=INKEY$:GOSUB11000:GO
TO100
8999 '***SAVING THROWS***
9000 CLS:PRINT"ENTER THE SAVING
THROW AGAINST:":PRINT:INPUT"DEAT
H, POISON, PARALY.";ST(1):GOSUB1
1020
9010 PRINT:INPUT"PETRIFICATION O
R POLY.";ST(2):GOSUB11020:PRINT:
INPUT"RODS AND WANDS";ST(3):GOSU
B11020
9020 PRINT:INPUT"BREATH WEAPONS"
;ST(4):GOSUB11020:PRINT:INPUT"SP
ELLS";ST(5):GOSUB11020:GOTO100
9999 '***COMBAT INFORMATION***
10000 CLS:INPUT" ARMOR CLASS";CI
$(0):GOSUB11020:PRINT:INPUT" ADJ
. TO HIT";CI$(1):GOSUB11020:PRIN
T:INPUT" DAMAGE ADJ.";CI$(2):GOS
UB11020
10010 PRINT:PRINT" DO YOU WANT T
O ADD WEAPONS OF    PROFICIENCY?
(Y/N)":K$=INKEY$
10020 GOSUB11060:IFK$="N"THEN100
10030 FORX=3TO20:IFCI$(X)<>""THE
N10060
10040 CLS:INPUT" ENTER THE WEAPO
N YOU WANT TO    ADD. (OR ENTER
'ZZ' TO QUIT)    ";CI$(X):GOSUB11
```

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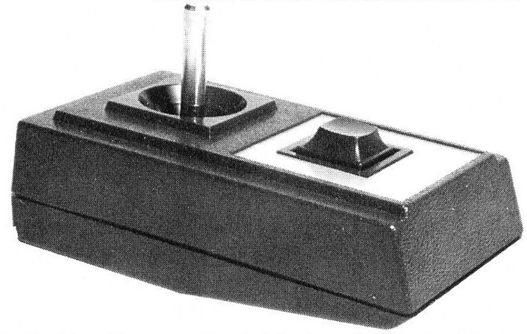

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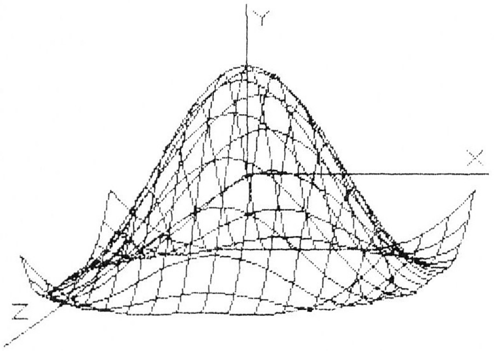
```
020
10050 IFCI$(X)="ZZ"THENCI$(X)=""
:GOTO100
10060 NEXTX
10070 PRINT"NO MORE SPACE":FORX=
1TO2000:NEXTX:GOTO100
11000 REM***HIT A KEY TO GO ON**
*
11010 IFINKEY$=""THEN11010ELSEGO
SUB11020:RETURN
11019 '***KEY BEEP***
11020 PLAY"T255L255O5CDEFGABAGFE
DC":RETURN
11029 '***DIMENSION ARRAYS***
11030 DIMDA(17,7),B$(18),C$(18),
NP$(62),ST(5),CI$(20),MP$(22,1),
SB$(62,1)
11032 DEFUSR0=16345
11035 RESTORE:FORX=1TO17:FORY=0T
O7:READDA(X,Y):NEXTY,X
11038 FORX=0TO18:READC$(X):NEXTX
11040 RETURN
11049 '***LIST ROUTINE***
11050 PRINT"HIT ANY KEY FOR MORE
";:K$=INKEY$:GOSUB11000:ZX=0:CLS
:RETURN
11059 '***YES OR NO***
11060 K$=INKEY$:IFK$<>"Y"ANDK$<>
"N"THEN11060ELSEGOSUB11020:RETUR
N
12000 '***THIEVING DATA***
12010 DATA 30,25,20,15,10,10,85,
0,35,29,25,21,15,10,86,0,40,33,3
0,27,20,15,87,0,45,37,35,33,25,1
5,88,20,50,42,40,40,31,20,90,25,
55,47,45,47,37,20,92,30,60,52,50
,55,43,25,94,35
12020 DATA 65,57,55,62,49,25,96,
40,70,62,60,70,56,30,98,45,80,67
,65,78,63,30,99,50,90,72,70,86,7
0,35,99.1,55,100,77,75,94,77,35,
99.2,60,105,82,80,99,85,40,99.3,
65,110,87,85,99,93,40,99.4,70,11
5,92,90,99,99,50,99.5,75
12030 DATA 125,97,95,99,99,50,99
.6,80,125,99,99,99,99,55,99.7,80
12032 '***CHARACTERISTICS***
12034 DATA STRENGTH,EX.STR. %,IN
TELLIGENCE,WISDOM,DEXTERITY,CONS
TITUTION,CHARISMA,NAME,CLASS,ALI
GNMENT,RACE,AGE,HEIGHT,WEIGHT,SE
X,HIT POINTS,LEVELS,THIEVING LEV
EL,RACE #
12040 '***ML ROUTINE DATA***
12050 DATA 198,32,182,1,90,142,4
,0,167,128,140,4,31,38,249,142,5
,224,167,128,140,6,0,38,249,142,
4,32,167,132,167,31,58,140,6,0,3
8,246,57
```

YOUR COLOR COMPUTER JUST EARNED A MATH DEGREE!



MATHMENU

Developed by an engineer, *Mathmenu* is a powerful menu-driven system to turn your Color Computer into an intelligent, flexible tool for mathematics and engineering. *Mathmenu* takes the tedium out of math, leaving your full brain power to attack the "meat" of your problems. By rapidly manipulating matrices and vectors, performing integration and differentiation, solving quadratic equations, plotting user defined functions and much more, *Mathmenu* can help simplify the most complex problems. Whether you are a student or a professional, if you use math, you need *Mathmenu.*

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NOW THERE ARE TWO TOOLKITS FOR THE COLOR COMPUTER

The software development tools that let you put even more **power** into the already powerful Color Computer. They're full of tools, aids, bells and whistles useful to the BASIC or MACHINE LANGUAGE programmer, in friendly, easy-to-use software packages.

BOTH TOOLKITS CONTAIN . . .

- **Light characters on dark background with Current Line Highlighting**; or normal characters
- **Full Screen Editor** with **Arrow Key controlled cursor; open up space/delete and close up space**
- Enabling selective **Line Renumber/copy/move/merge**; or normal Extended Basic line editor
- **Protect** the current BASIC program from being wiped out with a CLOAD, NEW etc.; or from being LISTed
- **Restore** a protected BASIC program/**Append** any number of BASIC programs together easily
- **Tone** on keypress or normal silent keys (Tone modifiable by use of Sound n,n Command)
- **Global Search** of command or text strings in BASIC programs with **wildcard** character and **next "."**
- **9 Screen Print Delays** with keyboard override (for slow, readable LISTings and DISK DIRectories)
- **Variable Name List**/String-Byte memory usage/Range of FREE MEM/Top of memory address display
- Fast Machine Code to BASIC DATA **converter** for storing machine code visibly in BASIC
- (C)SAVEM address/**Backup Tool** (Last file name, start, end and execute address)
- **Recovery of Lost BASIC** programs after NEW, BACKUP, DSKINI, etc.
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THE FULL TOOLKIT ALSO CONTAINS . . .

☐ **Merge BASIC** with Machine Code routines so machine code is "invisible" and (C)SAVE/(C)LOADable
☐ **9 BASIC RUN delays** with keyboard override; **Single Step(s)** mode with current line number display
☐ **Memory Examine/Modify** with HEX/ASCII/DEC/Double Decimal output and HEX/ASCII input
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☐ **Ten User Defined Function Keys** accessable with @/number (BASIC Macros/Block storage)
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☐ ASCII/HEX memory **Dumps** to screen or printer
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☐ Parallel **ECHO** of screen output to printer

THESE FEATURES ARE FOUND ON BOTH VERSIONS . . .

— **Transparent** to the user, Install it and forget it until you need it
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— **HELP** command lists all Kit commands and current Kit address
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— **Compatible** with other utility programs
— Green/Orange text screen capability
— Easily **modifiable** command syntax

The Kits are relocatable programs that load any time without bothering your BASIC program or variables or top of memory address. All tools may be turned on or off at will, including the Kit itself.

The tools are available with simple three or four letter commands entered in the direct mode, with the entire instruction set viewable through the HELP command.

The Colorkit is 5K bytes for $29.95
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- 64x64 color symmetrical display
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Disk File Utility with:

- **One key view/copy/load(m) of files**
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- **Print DIR with machine code address**
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DEER HUNT $15.95

- **Arcade shoot-em-up skill game**
- **Aim only for the deer**
- **Avoid hitting people, cars, train**
- **Will not cause tension headache**
- **BASIC/machine code hybrid**
- **Tape/Disk compatible**

ARIZIN
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Scottsdale, AZ 85252

Software Review...

Wormhole Is High-Energy Graphics Game

Now you can tour the depths of space through the miracle of *Wormhole*, a game combining natural curiosity with the color and imagination of the new technology to give you an inside look at what goes on in one of those "black holes." Just climb aboard your spaceship with FTL (faster than light) speed for an adventure.

Wormhole is a space game which derives its title from the space-time surrounding the ship, which, in theory, is formed in a "tube," similar to that inhabited by Earthbound worms. As you zoom into the meandering tube, you start collecting points because your ship collects "gold dust" that is formed when the FTL drive compresses space-time into the vacuum. As you attempt to negotiate the course, you are subject to a barrage of gold nodules, which appear when you least expect them. Blasting them into bits transforms them into valued objects, giving you one to nine points for each piece captured in the handy "jaws" attached to the nose of your spaceship. If you are careless and collide with one of them, however, your ship will suddenly drop below light-speed and sustain major damage, costing up to 50,000 points.

The ship is controlled by the right joystick, and easily so, I would add. The problem is when you take your eyes off of it for a second to check your score in the upper right part of the screen: Crash! Blinding lights! The ship blinks off and on, hangs for a second and the screen echoes disaster, displaying a dazzling array of color that is rivaled only by *2001: A Space Odyssey*.

There's really no problem, because as the screen says, you can press any key to continue. You only lose 50,000 points when you're knocked out of the hole. You start with three million and it's easy to recapture lost ground with a feature that enables you to gain speed during the game. Simply pressing "S" allows you to slow down if you feel you're losing control.

If the telephone rings and you're forced to leave the game for a few minutes, pushing the *BREAK* key allows you to freeze the game and retain your points until you return. It's also useful if you feel you're losing your concentration. The game does proceed rather rapidly and you are on constant alert.

You are able to move your ship faster by moving it up and down with your joystick—up or down and backward and forward. The "bursts" of speed gained via this method are recorded in the lower left part of the screen.

Another feature you'll like, and which may explain why you may need to use the *BREAK* key occasionally, is that there is no real end to the game—unless you get a minus score. Scores above 10 million are possible for the expert, but if you go over that figure, the scoreboard will display characters whose codes are 58 and higher (inverse colon ":", etc.). The window can hold only eight characters.

The creators of this fascinating game have been thoughtful enough to see to it that as many of us as possible can enjoy *Wormhole*, providing different commands for 16K Color BASIC, for 16K Extended BASIC, and, for those fortunate enough to have 32K. The man himself, John Bobst, explains that the set-up differences are needed because the game uses the area from 7168 to 16383 for program and Hi-Res screen. For 16K either BASIC or Extended BASIC, the hardware stack would be wiped out if the stack moved up. For 32K systems, the stack is initialized much higher up in memory and is safe from being overwritten.

Showing a strong trust in CoCo owners, Bobst graciously provides details on how to *CSAVEM* (cassette) or *SAVEM* (disk) a game in progress or to make a backup copy, insuring that his creation will have a long life.

Wormhole is well-conceived playing wise, has great graphics, strong sound effects, and will keep you transfixed for hours that pass by quickly.

(Zeta Software, P.O. Box 3522, Greenville, SC 29608, $17.95 on tape, plus $2.50 S&H)

—Charles Springer

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RAINBOW CERTIFICATION SEAL

"TRS-80 COLOR COMPUTER PRODUCTS"
"THE 1248-EP EPROM PROGRAMMER"

The 1248-EP EPROM PROGRAMMER is a full function unit that is compatible with virtually all popular 1K, 2K, 4K & 8K -by-8, 24 pin, 5 volt EPROMS. Compatible devices are 2508's, 2758 -0/1's, 2516's, 2716's, 2532's, 68732-0/1's, 68764's, and 68766's. Components 2732, 2732A, 2564, and 2764 are compatible via adapters (not supplied). The programmer is totally menu driven by resident position independent firmware in EPROM, which makes it suitable for experienced computer operators and novices alike.

Select the device type to be programmed from the device menu. Next, select the function to be performed from the function menu. On your command the 1248-EP will verify EPROM erasure, compare EPROM contents to specified contents of RAM or ROM, program blocks or individual bytes of EPROM memory or copy an EPROM's contents to user specified RAM.

The 1248-EP plugs into the cartridge slot of the Color Computer and is invoked by the user with the "EXEC & HC000" BASIC command. The 1248-EP contains its own on-board programming power supply, and has a quality "Zero Insertion Force" socket.

The combination of the TRS-80 Color Computer, an editor/assembler/monitor such as the Micro Works SDS80C✲✲ and the 1248-EP EPROM programmer, makes a high performance, cost effective software development station for MC-6800/6809 microprocessor based systems. Use the system to store your own games or utility programs in EPROM's for execution from the cartridge slot using the CK4 PROM/RAM card described below.

The cost of the 1248-EP EPROM PROGRAMMER, instructions and adapter diagrams is just $99.95.

"THE CK4 PROM/ROM CARD"

The CK4 works with 2K, 4K or 8K-by-8 ROM's or EPROM's of the 5 volt only variety in 24 pin packages. In addition, the CK4 may be used with 4 static RAM's such as 6116's to expand the computers memory work space by 8192 bytes. Each of the four on-board sockets can be decoded to any 2K block of the memory map from $C000 through $F800 of the Color Computer. In addition, each socket can be configured to respond to address blocks from 2K to 8K bytes in length, thus accommodating 2K, 4K or 8K-by-8 ROM's, EPROM's or RAM's. ROM and RAM can be mixed on the card as well. RAM, on the card, can be written to and then "write protected" via dip switches on the CK4 to emulate ROM.

The instructions include information on how to set up the socket decoding circuitry and how to provide battery backup for programs stored in CMOS static RAM on the CK4 with the computer off or the cartridge removed.

The popular CK4 PROM/RAM card is now available in three versions.

1) The full featured CK4 remains the standard of cartridge board flexibility with the added capability of providing battery backup for CMOS static RAM's such as 6116's. Cost of the CK4 is still just $29.95.

2) The CK4-1 is a ROM only version of the CK4 card for use with CoCo's with later than "E series" circuit boards. These later versions of CoCo are not able to write to cartridge based RAM without modification. Cost is $27.95 for the CK4-1.

3) The CK4-2 is the unpopulated CK4 series circuit board only. Buy this version of the CK4 and configure them to meet your specific requirements at a price designed to stretch your dollars value. Cost is $15.95 each.

"MORSE ENCODER/DECODER KIT"

The MEDK80 Morse En/Decoder Kit consists of a machine code software driver on tape, a schematic diagram of the interface circuitry, component parts, a printed circuit board (PCB), packaging suggestions and complete instructions for building a Morse code transmission and reception system that is compatible with 4K RAM and up models of the TRS-80 Color Computer.

The transmitter/receiver interface circuitry is totally optically isolated and is, therefore, compatible with all receivers and transmitters. Transmitter and receiver both connect to the interface unit and to the Color Computer via the RS-232 port.

The MEDK80 Morse En/Decoder kit operates at speeds up to 70 words per minute and automatically adapts to speed variations of the sender. When transmitting, words are transmitted only when fully formed, i.e., followed by a space, and the transmit text buffer gives visual notification to the operator of what word/character is currently being sent. In addition, the text buffer is 512 characters deep, which is sufficiently large to keep up with the best of "rag-chewers".

Potential purchasers of this product should have previous kit building experience. However, this is not a kit of great complexity, and is well within the abilities of those actively involved in amateur radio or electronic hobbies to construct. To reduce the chance of wiring errors, component placement is indicated on the PCB and detailed assembly instructions are included.

The cost of the MEDK80 software, parts, and instructions is $39.95.

"COCO" GETS A BREADBOARD

The COCO BREADBOARD is a circuit board that plugs directly into the cartridge slot of the Color Computer and provides the user with 16 square inches of predrilled breadboarding area for circuit development, interfacing experiments, motherboard implementation, or whatever your imagination conjures up. The plated thru holes in the breadboard are wirewrap pin compatible and on 0.10 inch centers.

The COCO BREAD BOARD brings all of the data, address, and control signals available at the cartridge slot outside of the body of the computer and the signal lines are appropriately labeled to facilitate error free wiring of breadboards. A ground plane is provided on the top side of the board and solder pads are provided on the bottom of the board, thus facilitating circuit grounding and point-to-point wiring. In short, the COCO BREADBOARD was designed with the experimenter in mind.

The COCO BREADBOARD is attractively priced to justify its use for even the lowest budget projects. It is an ideal vehicle for learning interfacing techniques. Buy extras to have on hand for those rainy weekends.

The COCO BREADBOARD costs just $19.95. Price for two (2) or more is $16.95 each.

FACTORY FRESH COMPONENTS:

ITEM	DESCRIPTION	PRICE
2716 EPROM	2K by 8 Bit, 350 ns	$4.50 ea.
2532 EPROM	4K by 8 bit, 350 ns	$6.50 ea.
6821P	P.I.A.	$3.50 ea.
74LS156	Open collector decoder	$1.70 ea.
Socket	ZIF, 24 pin, Aries	$7.95 ea.

Minimum component order: $25.00

ORDERING INFORMATION:

Add $3.00 to all orders to cover shipping and handling. Allow two weeks for personal checks. Canadian residents add 5% to cover special handling. Arizona residents add 4% sales tax. Sorry! No charges accepted. All items shipped UPS.

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ASSEMBLY CORNER

Beyond The 'Vaders'

By Dennis S. Lewandowski
***Rainbow* Contributing Editor**

This month we are going to add a couple of rows to our Invaders, and give them the ability to move to the bottom of the screen (and beyond if we let them). This is also the place where we are going to leave them. Starting next month we are going to switch the format around a little bit. We will take a short BASIC program, and convert it to Machine Language. The reason, it seems, is that we have left many possible programmers out of Machine Language due to the increasing complexity of this game program. This format will be easier to follow as each article will not depend upon the information contained in previous issues. You still will need to know how to use an Editor/Assembler, or a monitor program to enter the programs into the computer. Rather than explaining how an E/A or monitor works each couple of articles, a pamphlet will be made available, with a notice of how to obtain it contained at the end of each article. The pamphlet is still in the works and will be available by April (which is also the month of the RAINBOWfest, what a coincidence!).

Now, about the program. As I said, this is where I shall leave it. However, if someone wishes to finish it, *the Rainbow* and I would be more than happy to publish the listing. The items still needed are: Invaders firing down, Sound, and Scoring. Fairly simple? Good; let's see your version. I'm sure we could arrange some sort of prize or something for anyone who wishes to try their hand at it. The listing itself is rather lengthy and if you have been following the series you know that lines ending in asterisks are additions to the previous listing. So have fun—after all, that's what this computer is for.

The listing:

```
0E00                    NAM SPACE
0E00             HYRES  EQU $E00
0300             VAR    EQU $300
0302             NEWPL  EQU $302
0304             COUNT  EQU $304
0306             POS    EQU $306
0308             NWPOS  EQU $308
030A             HITS   EQU $30A
00B0             SHOT   EQU $B0
0E00                    ORG $1A00
1A00 86C0        START  LDA #$C0         MEDIUM GRAFICS
1A02 B7FF22             STA $FF22        SET CONTROL
1A05 B7FFC7             STA $FFC7        MOVE SCREEN UP
1A08 B7FFC9             STA $FFC9        INTO HIGH MEM
1A0B B7FFCB             STA $FFCB        FOR DISK USERS
1A0E B7FFC5             STA $FFC5        SET VDG
1A11 CC0000      SCREN  LDD #0           PUT 0 IN D
1A14 B70300             STA VAR          PUT 0 IN VAR
1A17 FD0306             STD POS          ZERO IT
1A1A FD0308             STD NWPOS        ZERO IT
1A1D FD030A             STD HITS         ZERO HITS
1A20 8E0E00             LDX #HYRES       PUT START IN X
1A23 ED81        PCLS   STD ,X++         DOUBLE TIME
1A25 8C1A00             CMPX #$1A00      END OF SCRN
1A28 26F9               BNE PCLS         CLEAR THAT SCRN
1A2A 8E19AE             LDX #$19AE       START POS'IN
1A2D BF0302             STX NEWPL        SAVE LOCATION
1A30 108E1A8C           LDY #BASE        GET BASE GRAFIC
1A34 8D3B               BSR DRBS         DRAW BASE
1A36 8608               LDA #8           # OF VADERS
1A38 B70304             STA COUNT        SET #
1A3B 8E0E20             LDX #$0E20       VADR START
1A3E BF0306             STX POS          SAVE POS
1A41 8D17               BSR VLOOP        DIPLAY ROW****
1A43 8608               LDA #8           ANOTHER ROW******
1A45 B70304             STA COUNT        SET#**********
1A48 8E0EE0             LDX #$EE0        2ND ROW*******
1A4B 8D0D               BSR VLOOP        DISPLAY ROW***
1A4D 8608               LDA #8           THIRD ROW********
1A4F B70304             STA COUNT        SET #*********
1A52 8E0FA0             LDX #$FA0        3RD ROW*******
1A55 8D03               BSR VLOOP        DISPLAY*******
1A57 7E1AA5             JMP GETKEY       START GAME***
1A5A BF0308      VLOOP  STX NWPOS        SAVE HERE TO
1A5D 108E1A9C           LDY #VADER       GET GRAPHIC
1A61 8D11               BSR LOOP         DISPLAY IT
1A63 7A0304             DEC COUNT        8 YET?
1A66 2708               BEQ NXROW        REPLACE OLD***
1A68 BE0308             LDX NWPOS        GET POS
1A6B C602               LDB #2           NEXT POSITION
1A6D 3A                 ABX              ADD TWO
1A6E 20EA               BRA VLOOP        TILL DONE
1A70 39          NXROW  RTS              DONE WITH ROW*******
1A71 BE0302      DRBS   LDX NEWPL        GET BASE POS'IN
1A74 A6A0        LOOP   LDA ,Y+          PUT GRAFIC IN A
1A76 8100               CMPA #0          CLS GRAPHIC
1A78 2708               BEQ OK           LET IT PASS
1A7A 8101               CMPA #1          ARE WE DONE
1A7C 2708               BEQ DONE
1A7E 8120               CMPA #$20        IS IT OFFSET
1A80 2505               BLO OFFSET       THEN DOIT
1A82 A780        OK     STA ,X+          IF NOT DISPLAY IT
1A84 20EE               BRA LOOP         NEXT GRAPHIC
1A86 39          DONE   RTS              RETURN
1A87 1F89        OFFSET TFR A,B          SWITCH A WITH B
1A89 3A                 ABX              ADD B & X
1A8A 20E8               BRA LOOP         CONTINUE
1A8C 801E        BASE   FCB $80,$1E      TOP & OFFSET
1A8E 2AAA1E             FCB $2A,$AA,$1E  MIDDLE
1A91 2AAA01             FCB $2A,$AA,1    BOTTOM
1A94 001E        CLNUP  FCB 0,$1E        TOP
1A96 00001E             FCB 0,0,$1E      MIDDLE
1A99 000001             FCB 0,0,1        BOTTOM
1A9C 76001E      VADER  FCB $76,0,$1E    TOP
1A9F 55001E             FCB $55,0,$1E    MIDDLE
1AA2 410001             FCB $41,0,1      BOTTOM
1AA5 7C0304      GETKEY INC COUNT        TIMER
1AA8 2771               BEQ CHECK        IS IT TIME?***
1AAA BDA1C1             JSR $A1C1        INKEY$
1AAD 27F6               BEQ GETKEY
1AAF 8109               CMPA #9          RT ARROW?
1AB1 2710               BEQ MOVRT        MOVE RIGHT
1AB3 8108               CMPA #8          LF ARROW?
1AB5 2728               BEQ MOVLF        MOVE LEFT
1AB7 8120               CMPA #$20        SPACE?
1AB9 2741               BEQ FIRE         SHOOT SHOT
1ABB 8158               CMPA #$58        X?
1ABD 102700C0           LBEQ BACK        EXIT
1AC1 20E2               BRA GETKEY       NONE OF ABOVE
1AC3 BE0302      MOVRT  LDX NEWPL        GET CURRENT LOC
1AC6 8C19BF             CMPX #$19BF      RT LIMIT
1AC9 27DA               BEQ GETKEY       TO FAR
1ACB 108E1A94           LDY #CLNUP       BLANK GRAPHIC
1ACF 8DA0               BSR DRBS         ERASE OLD POS'IN
1AD1 7C0303             INC NEWPL+1      ONE PLACE
```

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*** NEW ***

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KID'S FUN-PAK: This 3 program game set will entertain you with a great new dimension for your computer. Tutorial included with documentation.

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```
0097 1AD4 BE0302              LDX NEWPL     GET POSITION
0098 1AD7 108E1A8C            LDY #BASE     GET GRAPHIC
0099 1ADB 8D94                BSR DRBS      DISPLAY IT
0100 1ADD 20C6                BRA GETKEY    DONE
0101 1ADF BE0302        MOVLF LDX NEWPL     GET CURRENT LOC
0102 1AE2 8C19A1              CMPX #$19A1   LF LIMIT
0103 1AE5 27BE                BEQ GETKEY    TOO FAR
0104 1AE7 108E1A94            LDY #CLNUP    BLANK BASE
0105 1AEB 8D84                BSR DRBS      ERASE
0106 1AED 7A0303              DEC NEWPL+1   ONE SPACE
0107 1AF0 BE0302              LDX NEWPL     GET LOCATION
0108 1AF3 108E1A8C            LDY #BASE     GET GRAPHIC
0109 1AF7 BD1A71              JSR DRBS      DISPLAY
0110 1AFA 20A9                BRA GETKEY    DONE
0111 1AFC FC0302        FIRE  LDD NEWPL     GET BASE LOC
0112 1AFF 830020        LOOP1 SUBD #$20     NEXT LINE UP
0113 1B02 10830E00            CMPD #$0E00   TOP OF SCREEN
0114 1B06 259D                BLO GETKEY    BACK TO MAIN
0115 1B08 1F01                TFR D,X       SWITCH X & D
0116 1B0A E684                LDB ,X        HIT?
0117 1B0C 2E56                BGT HIT       IF DO IT
0118 1B0E 8680                LDA #$80      SHOT GRAPHIC
0119 1B10 A784                STA ,X        DISPLAY SHOT
0120 1B12 4A            LOOP2 DECA          SMALL WAIT
0121 1B13 26FD                BNE LOOP2     SO WE CAN SEE
0122 1B15 A784                STA ,X        CLEAN UP SHOT
0123 1B17 1F10                TFR X,D       SWITCH BACK
0124 1B19 20E4                BRA LOOP1     TO THE TOP
0125 1B1B BE0306        CHECK LDX POS       GET LINE ADR****
0126 1B1E 3610                PSHU X        SAVE ADDRESS******
0127 1B20 8D24                BSR MOVE      DO FIRST ROW***
0128 1B22 BE0306              LDX POS       GET ADDRESS*****
0129 1B25 C6C0                LDB #$C0      SKIP 2 ROWS*****
0130 1B27 3A                  ABX           X+B=NEXT ROW*********
0131 1B28 3610                PSHU X        SAVE ADDRESS******
0132 1B2A 8D1A                BSR MOVE      DO 2ND ROW*****
0133 1B2C FC0306              LDD POS       GET ADDRESS*****
0134 1B2F C30180              ADDD #$180    OFFSET FOR 3*
0135 1B32 1F01                TFR D,X       PUT RESULT IN X*
0136 1B34 3610                PSHU X        SAVE ADDRESS******
0137 1B36 8D0E                BSR MOVE      DO 3RD ROW*****
0138 1B38 7C0307              INC POS+1     ADVANCE******
0139 1B3B 2703                BEQ FIX       MOVED 255 YET?**
0140 1B3D 7E1AA5              JMP GETKEY    RET TO MAIN**
0141 1B40 7C0306        FIX   INC POS       ADJUST MSB******
0142 1B43 7E1AA5              JMP GETKEY    RET TO MAIN**
0143 1B46 8660          MOVE  LDA #$60      # OF BYTES
0144 1B48 B70301              STA VAR+1     SAVE #
0145 1B4B A680                LDA ,X+       GET BYTE
0146 1B4D E684          AA    LDB ,X        GET NEXT BYTE
0147 1B4F A780                STA ,X+       MOVE BYTE
0148 1B51 7A0301              DEC VAR+1     COUNTER-1
0149 1B54 A684                LDA ,X        GET ANOTHER
0150 1B56 E780                STB ,X+       PUT IN POS'N
0151 1B58 7A0301              DEC VAR+1     ONE DONE
0152 1B5B 26F0                BNE AA        DONE YET?
0153 1B5D 3710                PULU X        GET LINE ADR******
0154 1B5F 8600                LDA #0        BLANK GRAPHIC
0155 1B61 A784                STA ,X        CLEAN START POS
0156 1B63 39                  RTS           THIS IS NOW A SUB***
0157 1B64 7C030A        HIT   INC HITS      # OF HITS
0158 1B67 1F10                TFR X,D       SWITCH X&D
0159 1B69 830040              SUBD #$40     POSITION
0160 1B6C 1F01                TFR D,X       BACK IN X
0161 1B6E 108E1A94            LDY #CLNUP    GET BLANK
0162 1B72 BD1A74              JSR LOOP      ERASE VADER
0163 1B75 B6030A              LDA HITS      GET NUMBER
0164 1B78 8118                CMPA #$18     ALL GONE?******
0165 1B7A 1027FE82            LBEQ START    GO AGAIN
0166 1B7E 7E1AA5              JMP GETKEY    GOTO MAIN
0167 1B81 0A71          BACK  DEC $71       -1 RESTART VECTOR
0168 1B83 7EA027              JMP $A027     BACK TO BASIC
0169 1B86                     END START

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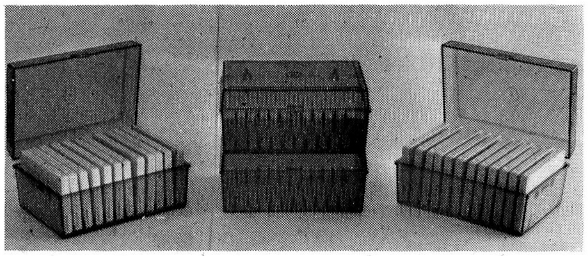

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"Pac" Up Your Scuba Gear

Nibbler and *Ms. Nibbler*, by Thomas Czarnecki, are a matched pair of maze games in which the scene of the action is an undersea pearl bed and you are a hungry oyster merrily eating sand to make your pearls. But, all is not well in "oyster-dom," for lurking in a cave in the center of your pearl bed are three Sand Monsters who just *love* raw oysters. Your only hope for survival is to evade your pursuers until you can get to one of the four Magic Catalyzer pellets which lie in the four corners of the maze. Then you become not only immune to the Monsters, but also suddenly hungry *for them*! Well, if this scenario doesn't seem vaguely familiar, then you *obviously* haven't been inside an arcade in quite a while.

Both of these Machine Language games are basically the same except that *Nibbler* uses color-set one while *Ms. Nibbler* offers color-set two, a different maze and *Ms. Nibbler* wearing pink lipstick. The programs are auto-executing with very good title graphics that really show what can be done with Color BASIC's CHR$ graphics. The animation is smooth with very little flicker and the game graphics are good, especially the Sand Monsters, which are slightly "space invaderish." The joystick action is *quite* good and won't "hang up" on those quick corners (unlike some "Pac" games I've seen) even with "Shack" joysticks.

The scoring is well explained in the documentation which is identical for both games. You get 15 points for each pile of sand (dot) turned into a pearl and there is a starfish worth 500 points that randomly appears for short lengths of time just below the Monster Cave. The catalyzers are worth 30 points, and while "catalyzed," the value for eating Sand Monsters is 100 for the first one and then doubles for each additional one you get before the effect wears off (you can tell when your time is running out because your shell "clatters" audibly). There is on-screen scoring and a "Top Ten" roster at the end of the game where up to three initials may be entered.

Due to the similarity of these two games I would really recommend buying only one or the other (unless you have the $$$...but, they *are* different). As to which one, it all depends. *Nibbler*, due to its color set, is a better choice if you are limited to a B/W TV, but I found the Ms.-Maze to be a little tighter and more of a challenge. All in all, they are both good renditions of the arcade game and would make a nice addition to the game shelf of anyone looking for an enjoyable "Pac" type game.

Happy Nibbling!

(Nelson Software System, 9072 Lyndale Ave. So., Minneapolis, MN 55420, $24.95 tape, $29.95 disk plus $3.00 p/h)

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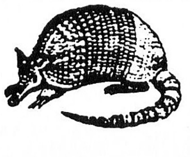

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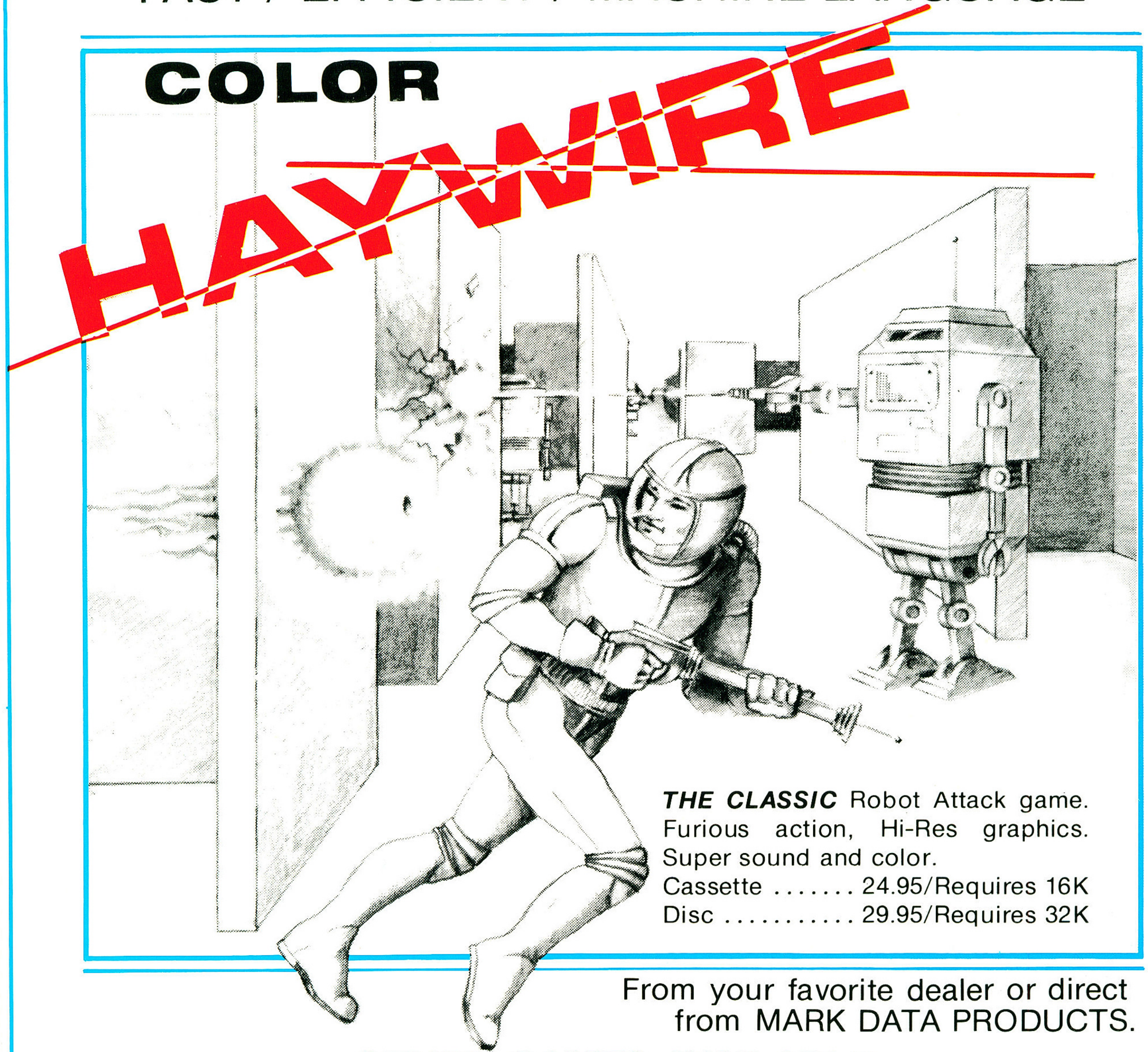

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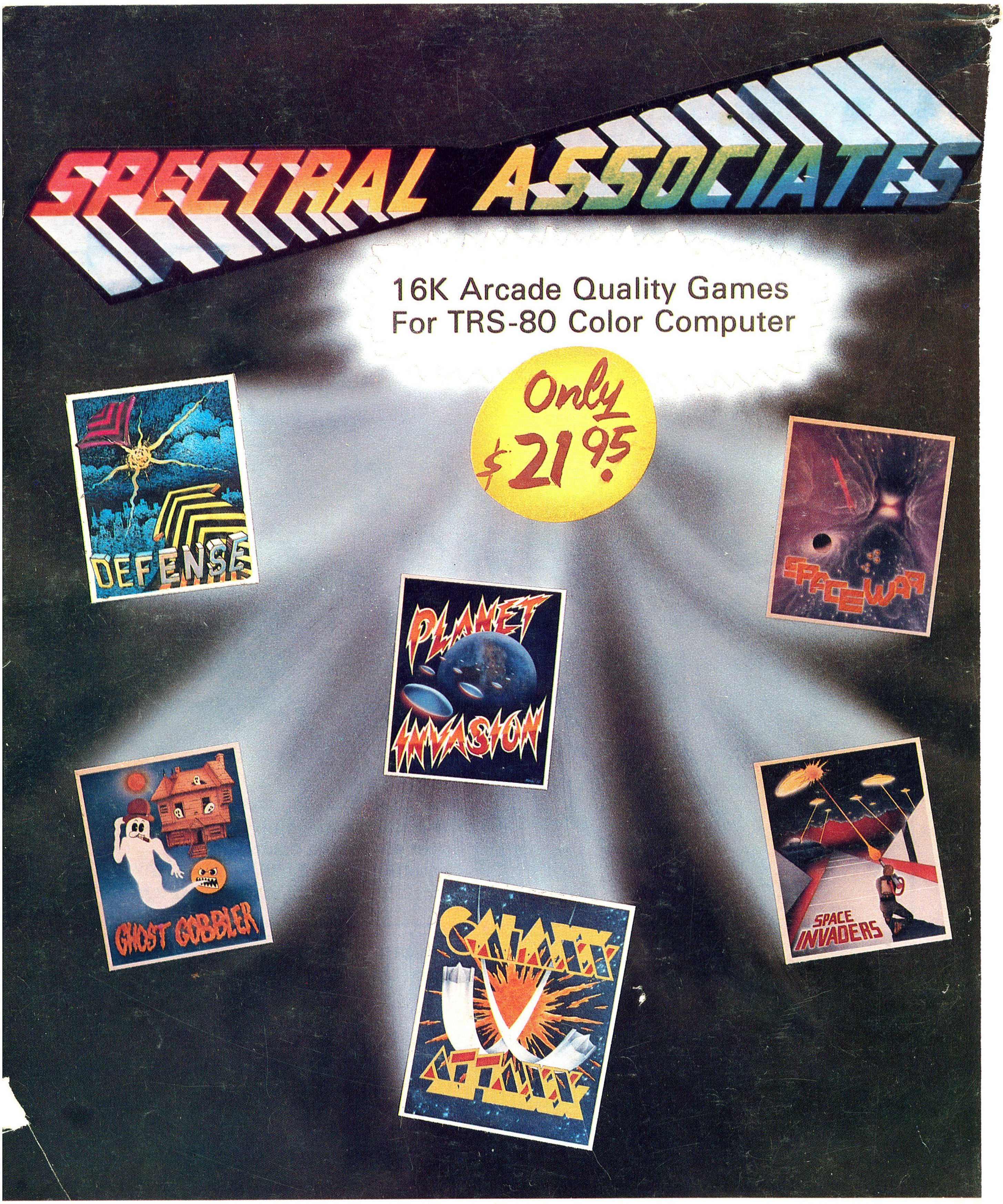
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